NEW

Canon Beginner's Handbook

196 PAGES OF EXPERT ADVICE

Master your Canon EOS SLR with our step-by-step guides

- Get to grips with aperture, shutter speed and ISO
- Improve your pictures
- Exposure made easy
- Comprehensive SLR College course
- Learn key menus and controls

Canon
EOS 700D

10 FREE VIDEO GUIDES

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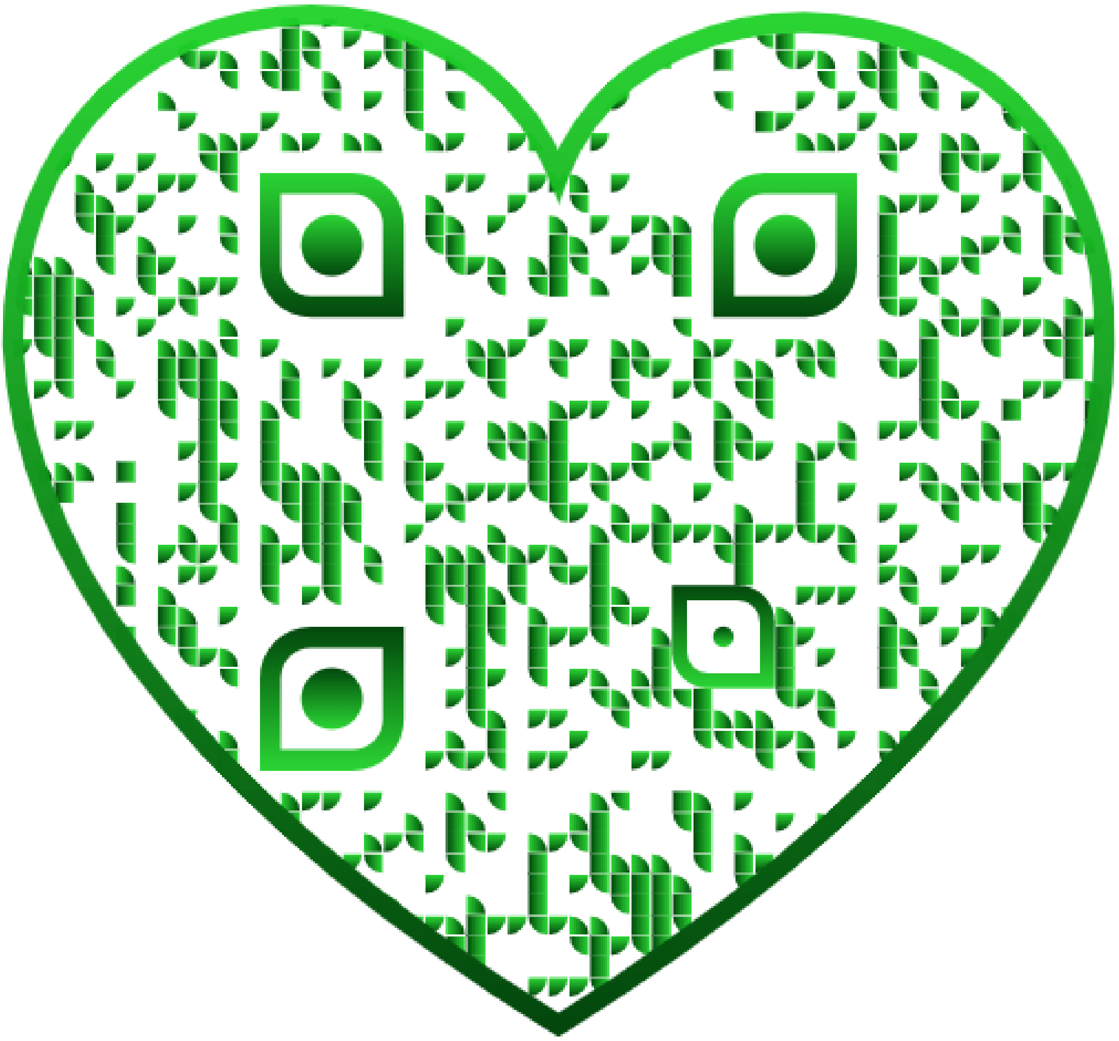
Digital Edition

FUTURE

NINTH EDITION



Canon Beginner's Handbook

Welcome…

Welcome to the new *Canon Beginner's Handbook*, your 196-page guide to using your Canon EOS DSLR. It doesn't matter if you're an absolute beginner who's just bought a new Canon camera or you're a seasoned enthusiast who needs a refresher course, inside you'll find all you need to know to really get to grips with your DSLR.

With so many seemingly complex controls, menu settings and dials, where do you begin? Over the following pages you'll discover all the vital camera techniques you need to master, from using the viewfinder and Live View to shooting in fully automatic mode, progressing all the way to using semi-automatic and manual shooting modes, when you're able to take control of your camera's settings.

There are also 10 free video guides that you'll find on FileSilo (see page 194 for details).

Once you've learned the basics, in the final chapter of this book you'll find our comprehensive 12-part SLR College Course, full of essential photography techniques, all explained in easy-to-follow lessons.

We hope you enjoy reading this *Canon Beginner's Handbook* and it helps you to start improving your Canon DSLR setup and techniques today.

Canon
EOS 750D
CANON ZOOM LENS EF-S 18-55mm 1:3.5-5.6 IS STM
φ58mm

FUTURE

Canon Beginner's Handbook

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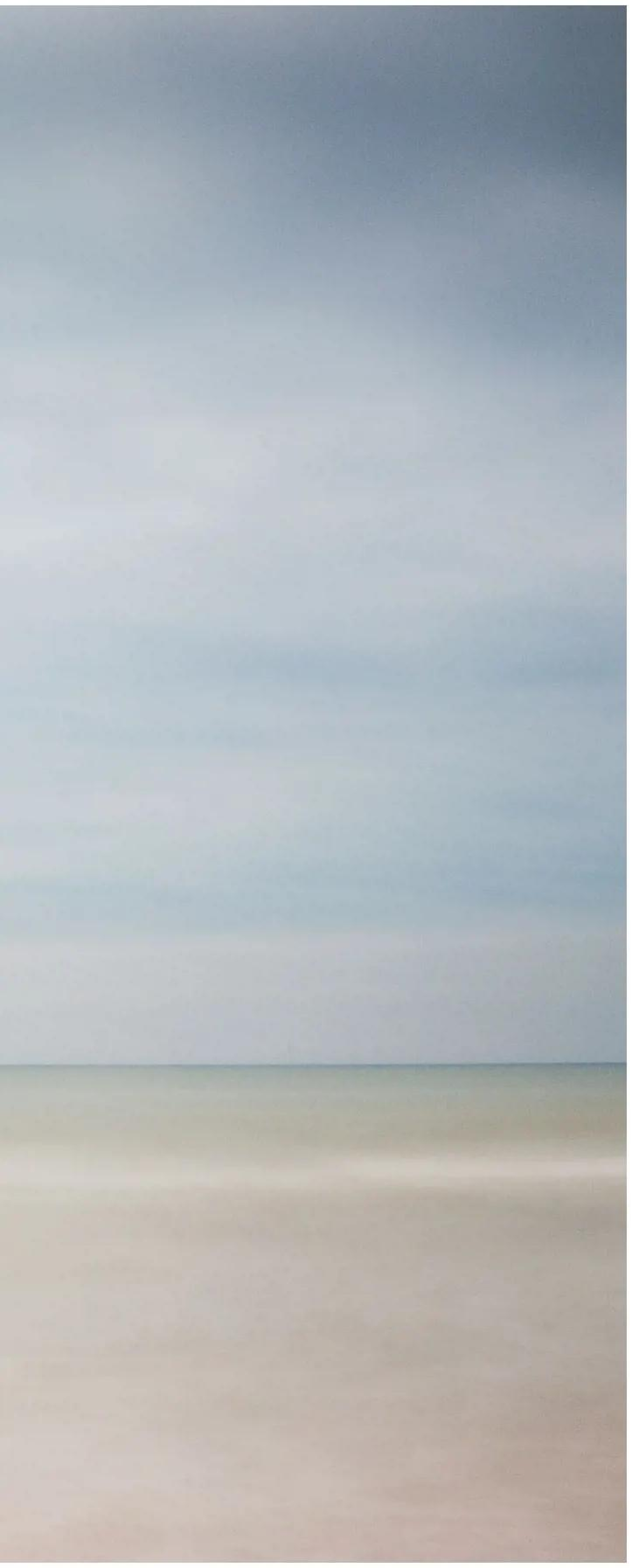
SEE PAGE 194 FOR DETAILS



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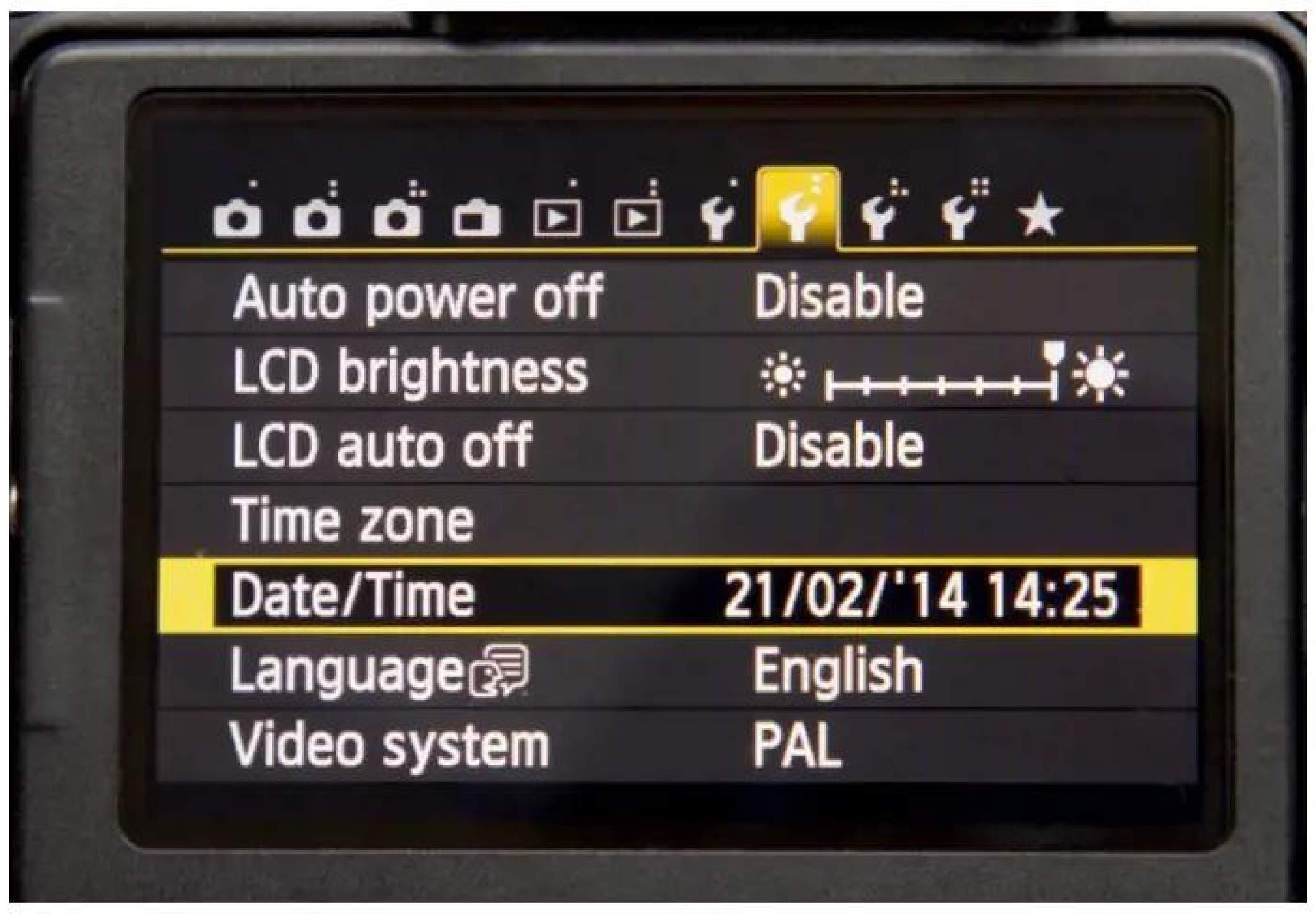
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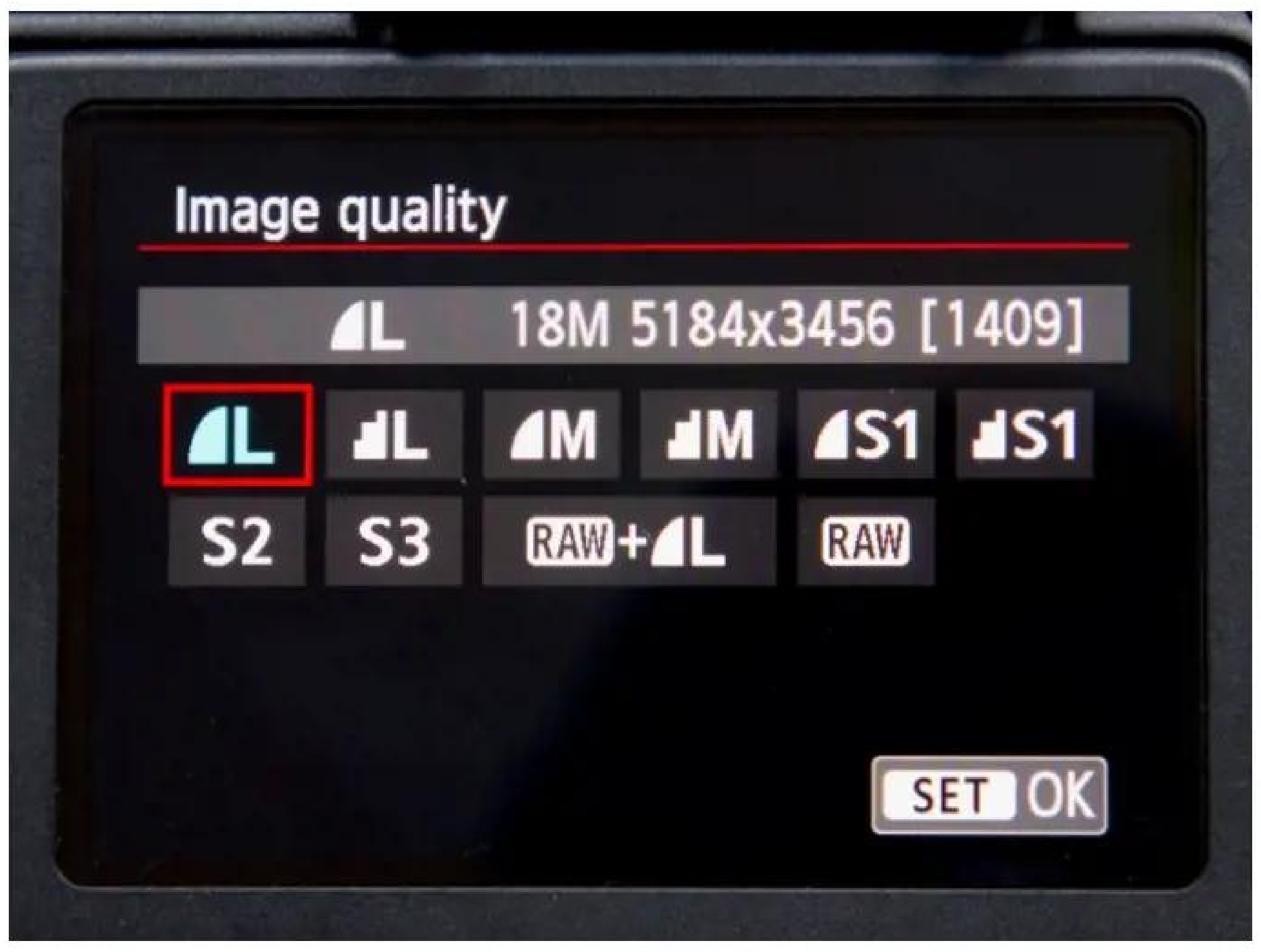
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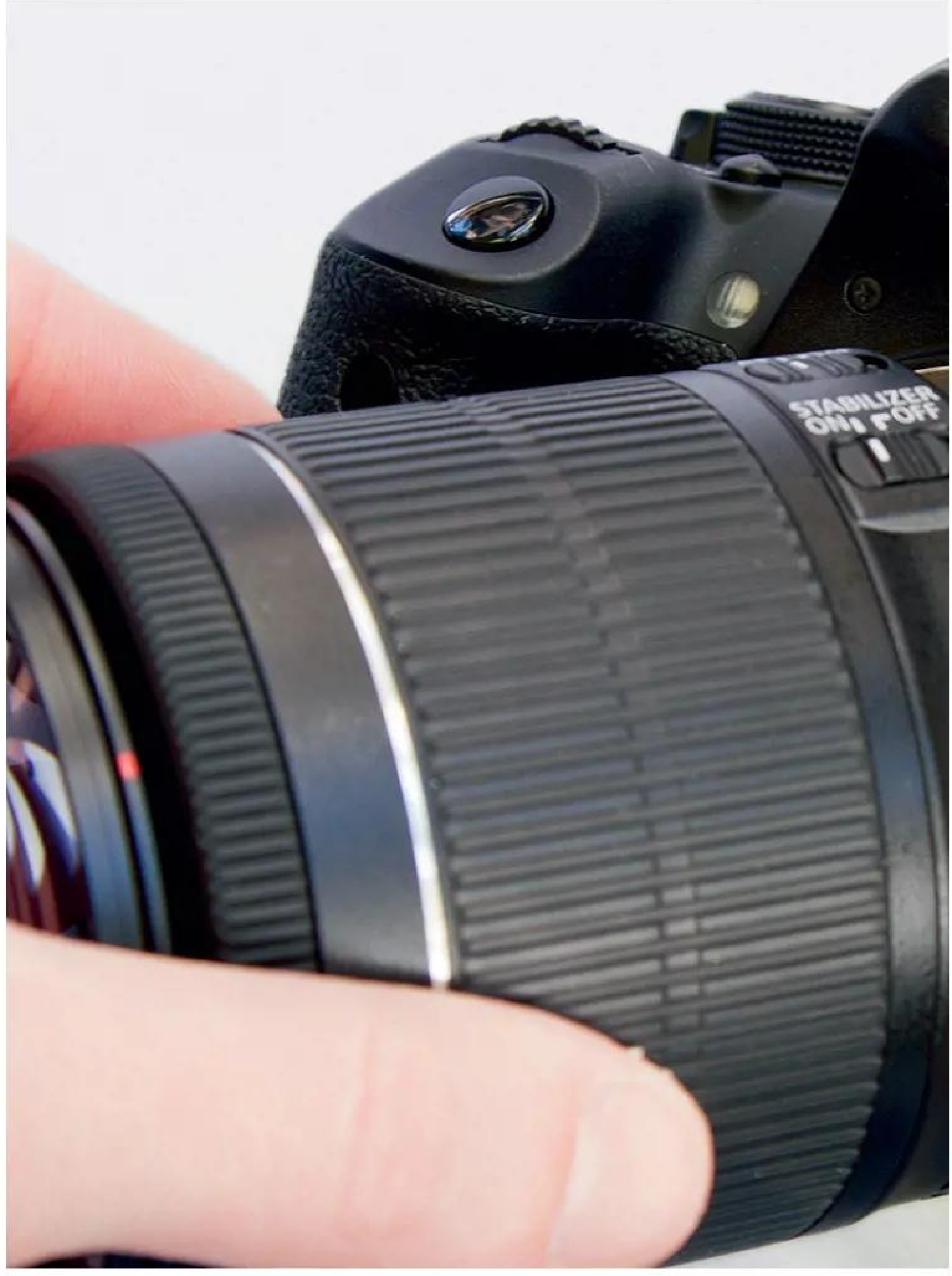
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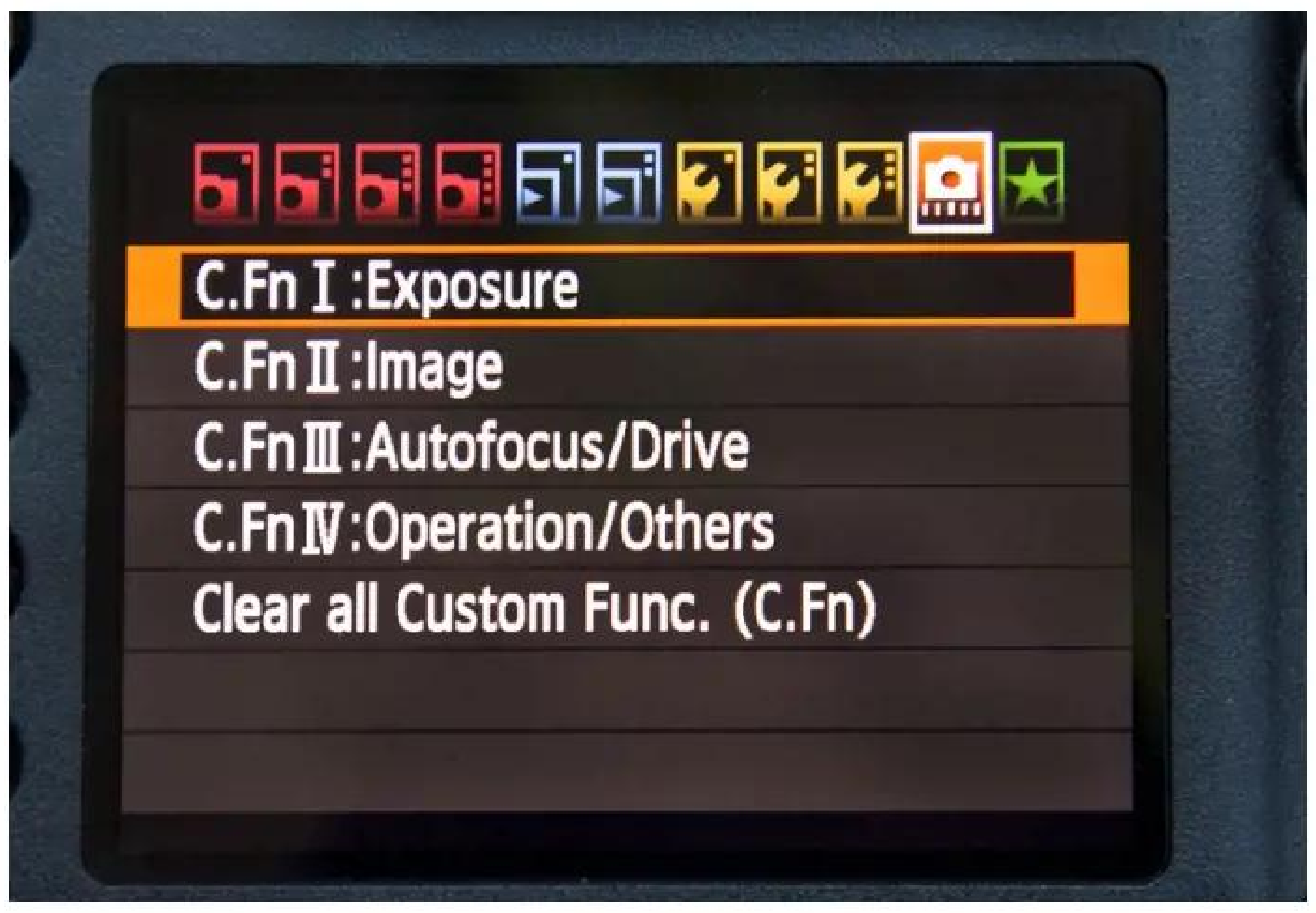
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Clear all Custom Func. (C.Fn)

Canon
EOS 700D

Image quality ◢L
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Image review 2 sec.
Lens aberration correction
Red-eye reduc. Disable
Flash control

Set up your new SLR

Set up your new Canon digital SLR, and discover how to use all the main dials, buttons, and menus

10 **Get your camera ready to shoot**

You've just got your new Canon digital SLR camera out of the box – here's what to do next...

12 **An overview of your camera's controls**

Understand what each of your new digital SLR's dials, buttons and settings are used for

16 **Start taking control of your camera**

Discover how to use the main controls that alter your D-SLR's settings. Once you get your head around these, you'll find it easier to start capturing better images

18 **Discover how to navigate the settings menus**

Find what you're looking for fast using your digital SLR's built-in menu system

20 **Set the in-camera file options**

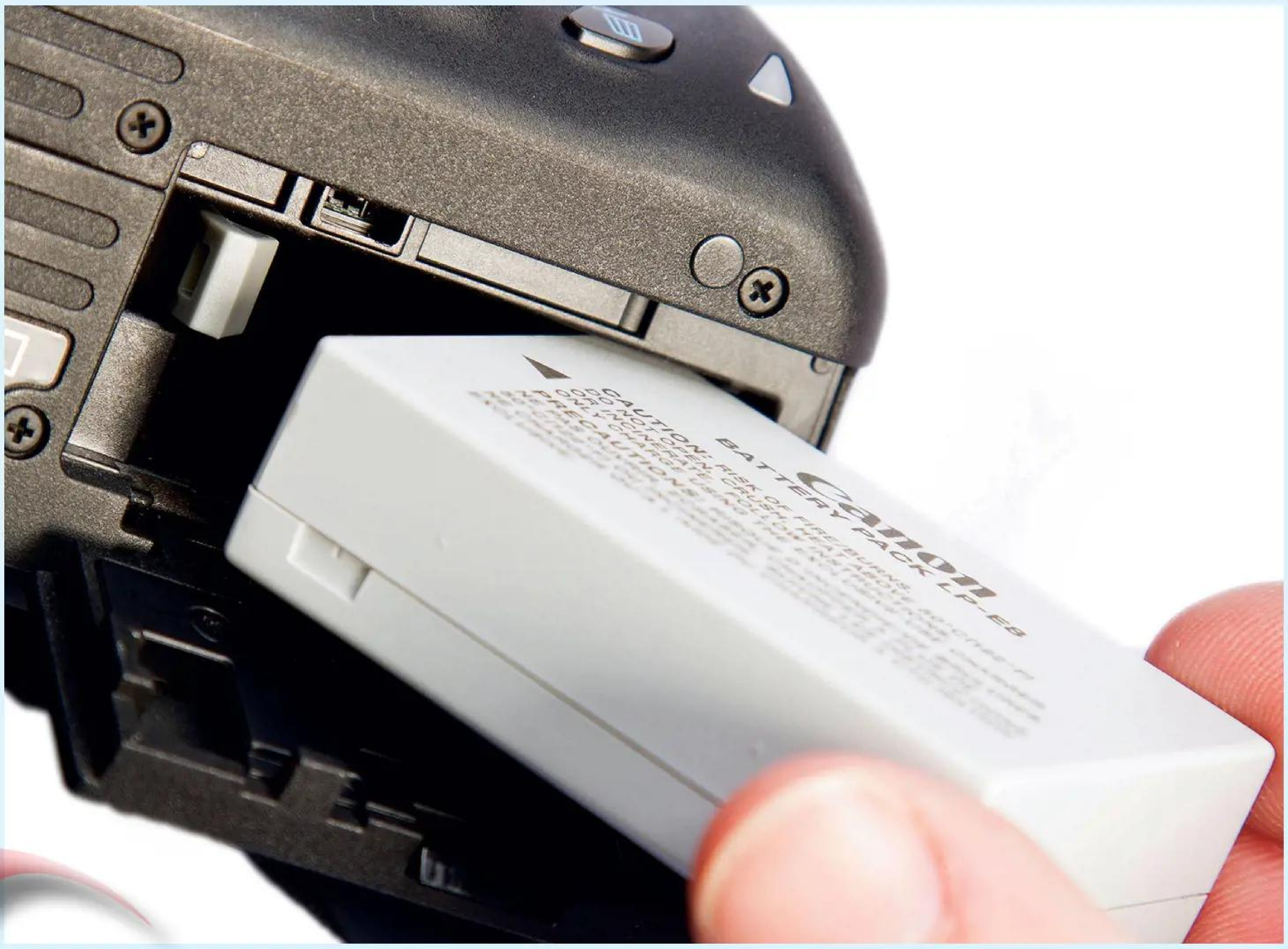
Format your memory card, set the correct time and date, and define the image quality you want to use

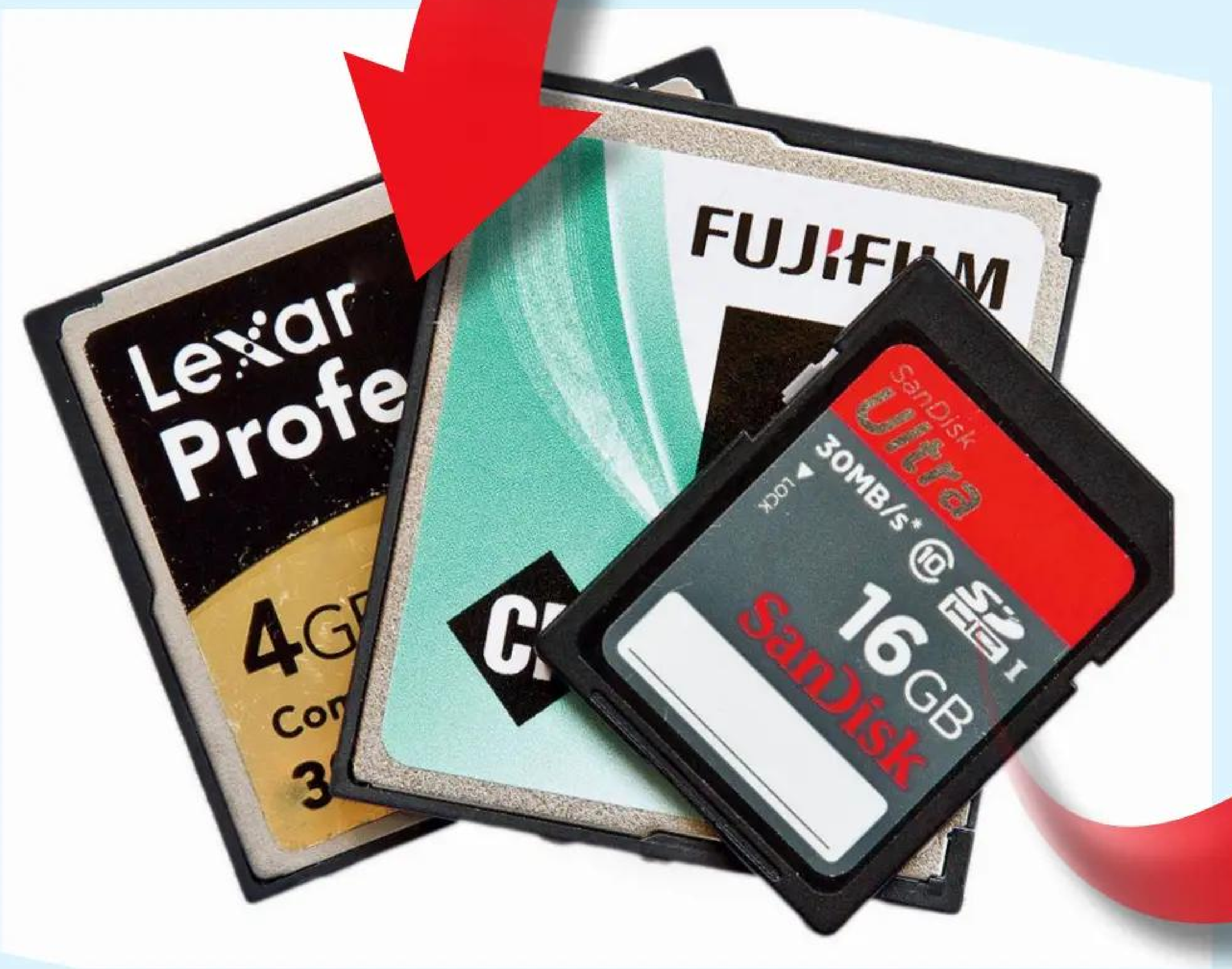
Get your camera ready to shoot

You've just got your SLR out of the box – here's what to do next…

1 Insert the battery

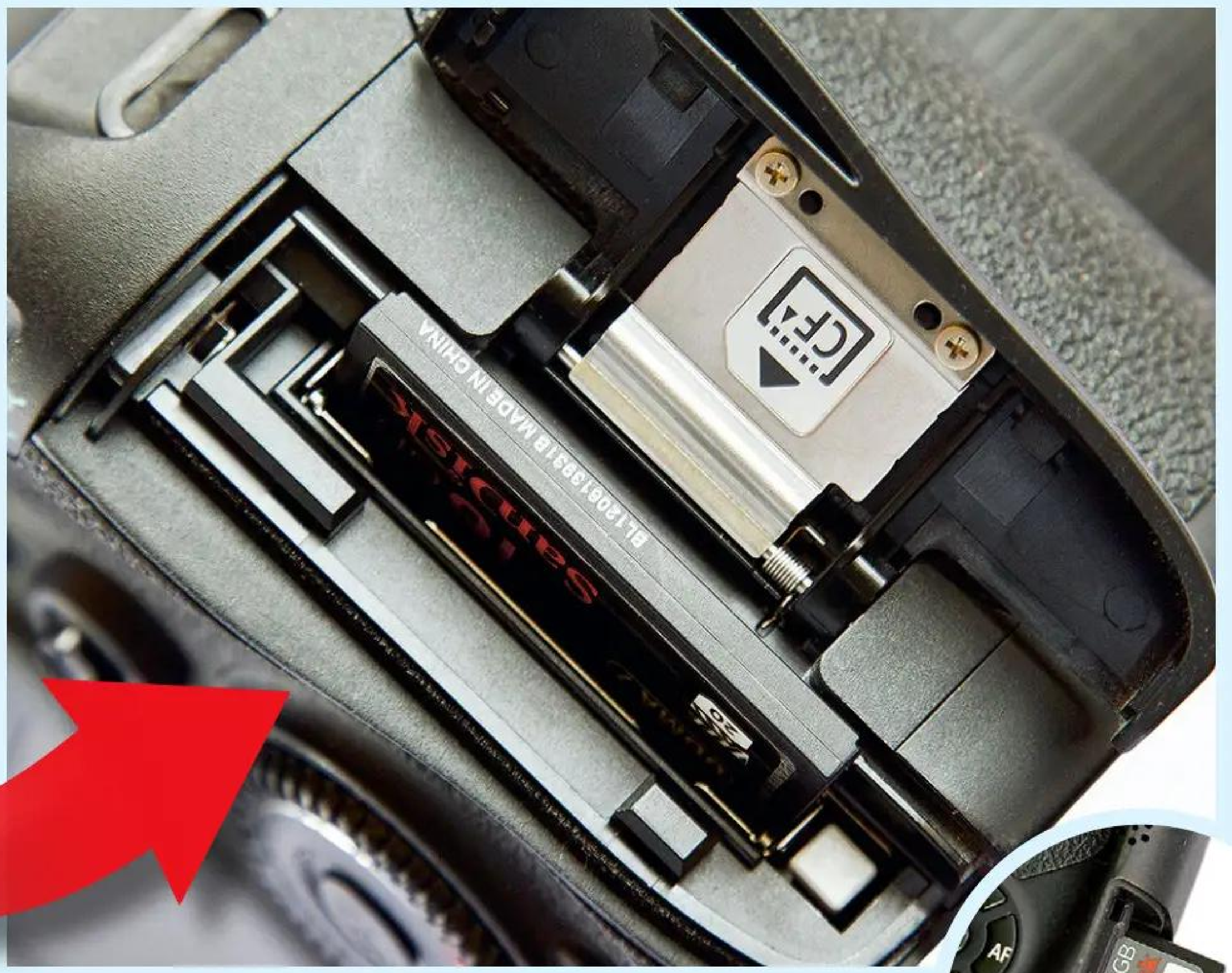
Without power your D-SLR is useless. So step one in getting started is to insert a fully charged battery. Your Canon D-SLR comes provided with a Lithium-ion battery and charger. When the light stops flashing, your battery is charged. A spare battery can come in handy. If you want a backup, check the battery type. Find the code written on the battery body, starting with the letters, LP.





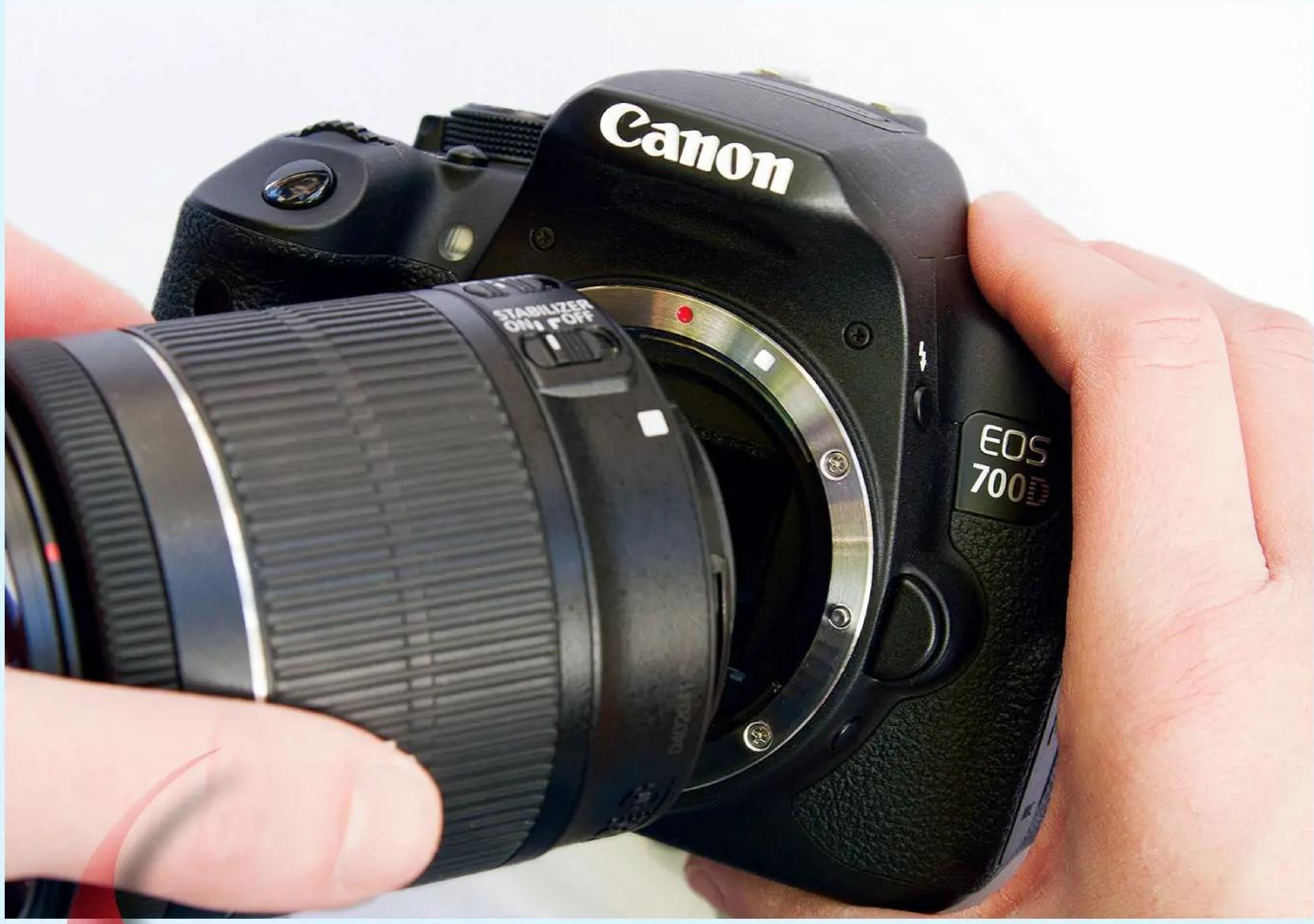
2 Get the right memory card

Next we need to insert the correct memory card. Canon D-SLRs take either an SD-type card (SD, SDHC, SDXC) or a CompactFlash card. Some models, such as the 5D Mk III, take both. CompactFlash cards are bigger than SD cards. You should also consider the capacity of the memory card, and the writing speed. For beginners we recommend an 8GB or 16GB card that can write at a speed of 25mb/s or faster.



3 Insert the memory card

The memory card slot will either be on the side of the camera body or in the main battery compartment. To insert the card, push it until it clicks into place. To remove it, either press the adjacent Eject button, or for an SD card, push it until it springs from the slot.

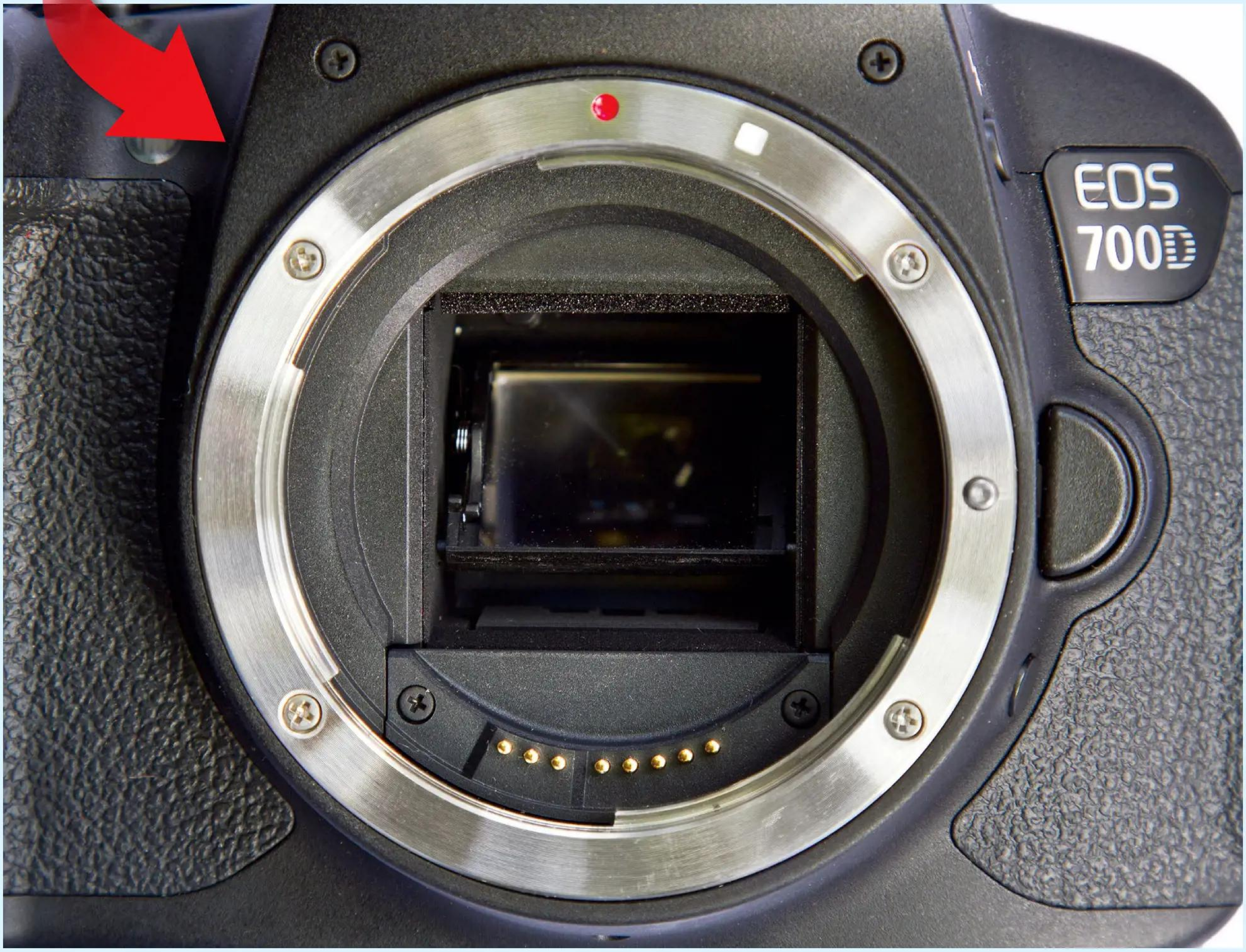


4 Attach a lens

Finally, we need to attach a lens. Remove the back cap from the lens and the protective body cap from the camera. They both twist off. Line up the white or red coloured dot with the same coloured dot on the lens. Twist it in a clockwise direction until it clicks into place. To remove it, press the lens release button and rotate it.

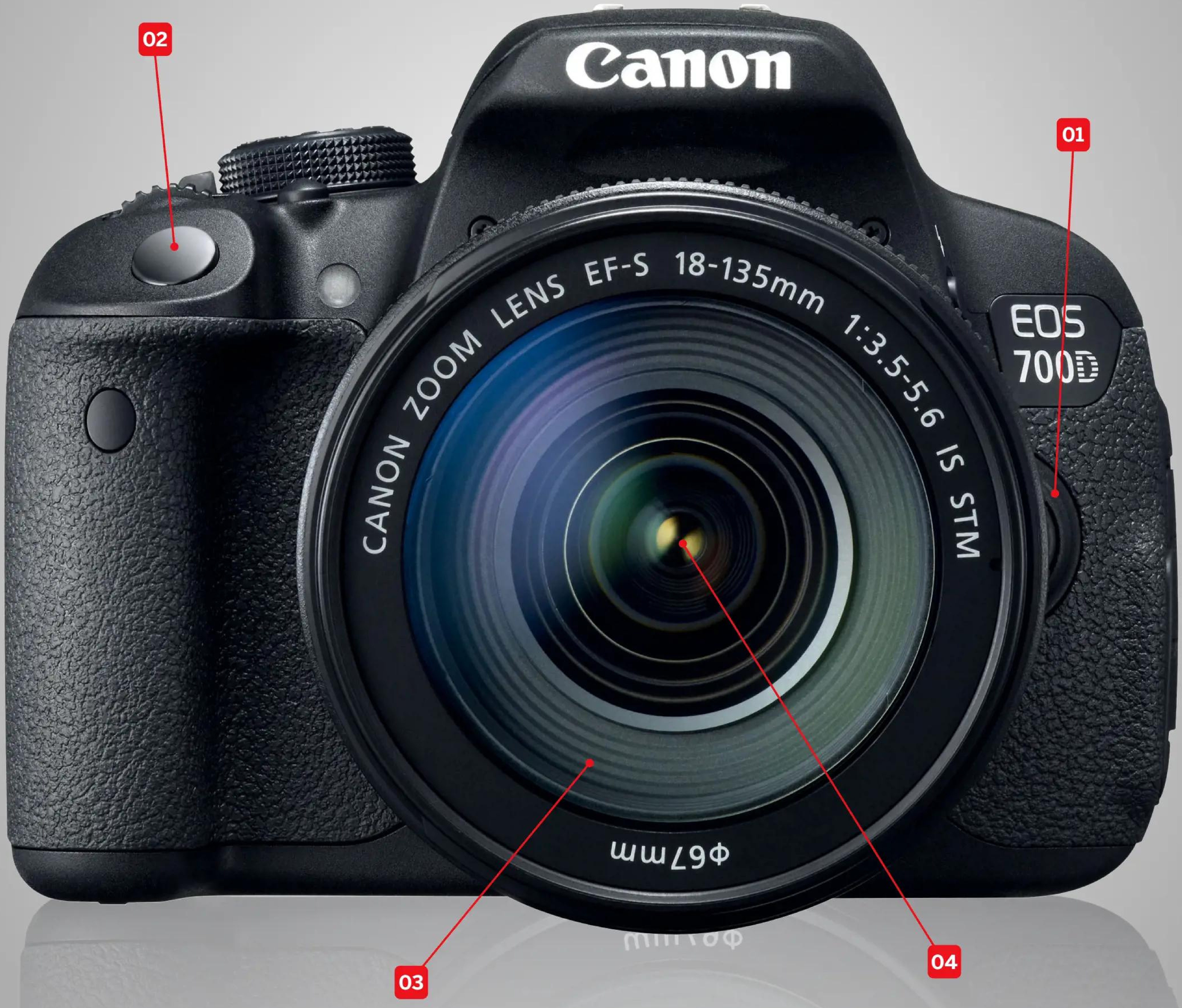
5 Lens changing tips

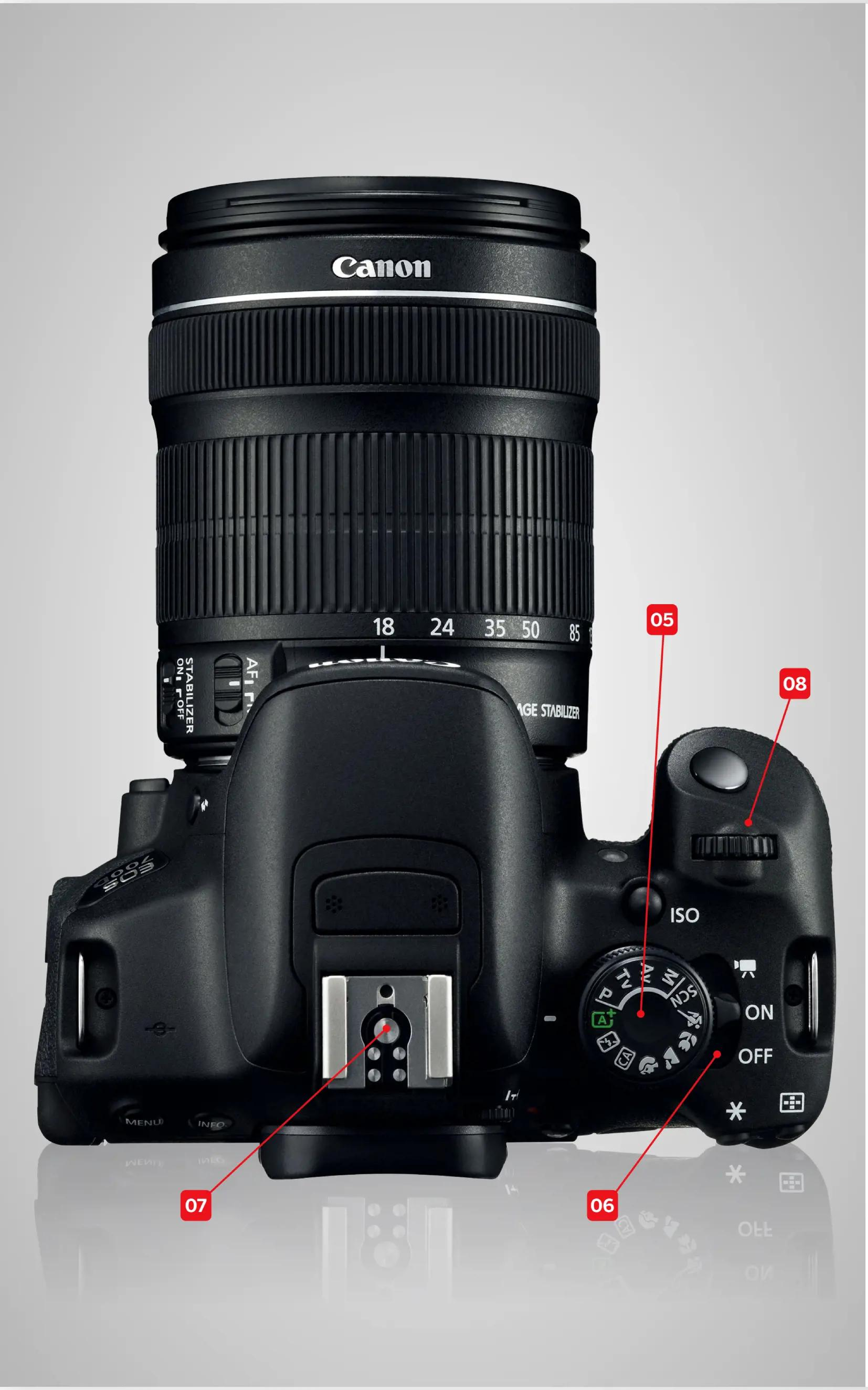
Changing the lens is easy, but there are a couple of important points to take on board. First, keep your camera switched off when changing the lens. You also need to avoid getting your camera's sensor dirty, by having your lens ready to hand when swapping over. Find a protected spot out of the wind to do it in. Your camera bag doubles up as a handy place for performing this task.



Controls overview

Understand each of your new DSLR's dials, buttons and settings





01 LENS RELEASE

To remove the lens press this button and twist the lens in an anti-clockwise direction. Make sure you have the protective body cap or another lens to hand when performing this task, because you don't want to leave the sensor exposed.

02 SHUTTER RELEASE

To capture a photograph, press the shutter release button on the top panel. To focus and meter the scene, half press the shutter release first.

03 LENS

The beauty of owning a DSLR is that you can change the lens. This makes it far more versatile than a camera with a fixed lens because you can alter the angle of view.

04 SENSOR

The sensor is where your images are recorded, before being processed and then stored on your memory card. A mirror blocks the sensor and projects the scene up through the viewfinder. When you take a photograph, the mirror flips up out of the way so that the light can be recorded by the image sensor.

05 MODE DIAL

The mode dial is where you access the camera's shooting modes. Here you communicate with your DSLR, telling it what you want it to control, and what you want to alter manually. For first time users, the Fully Auto mode is appealing because it selects all the camera settings for you.

06 ON/OFF SWITCH

Turn the camera on and off with this switch. Your DSLR will automatically power down if you stop using it for a certain amount of time. This is to save battery life.

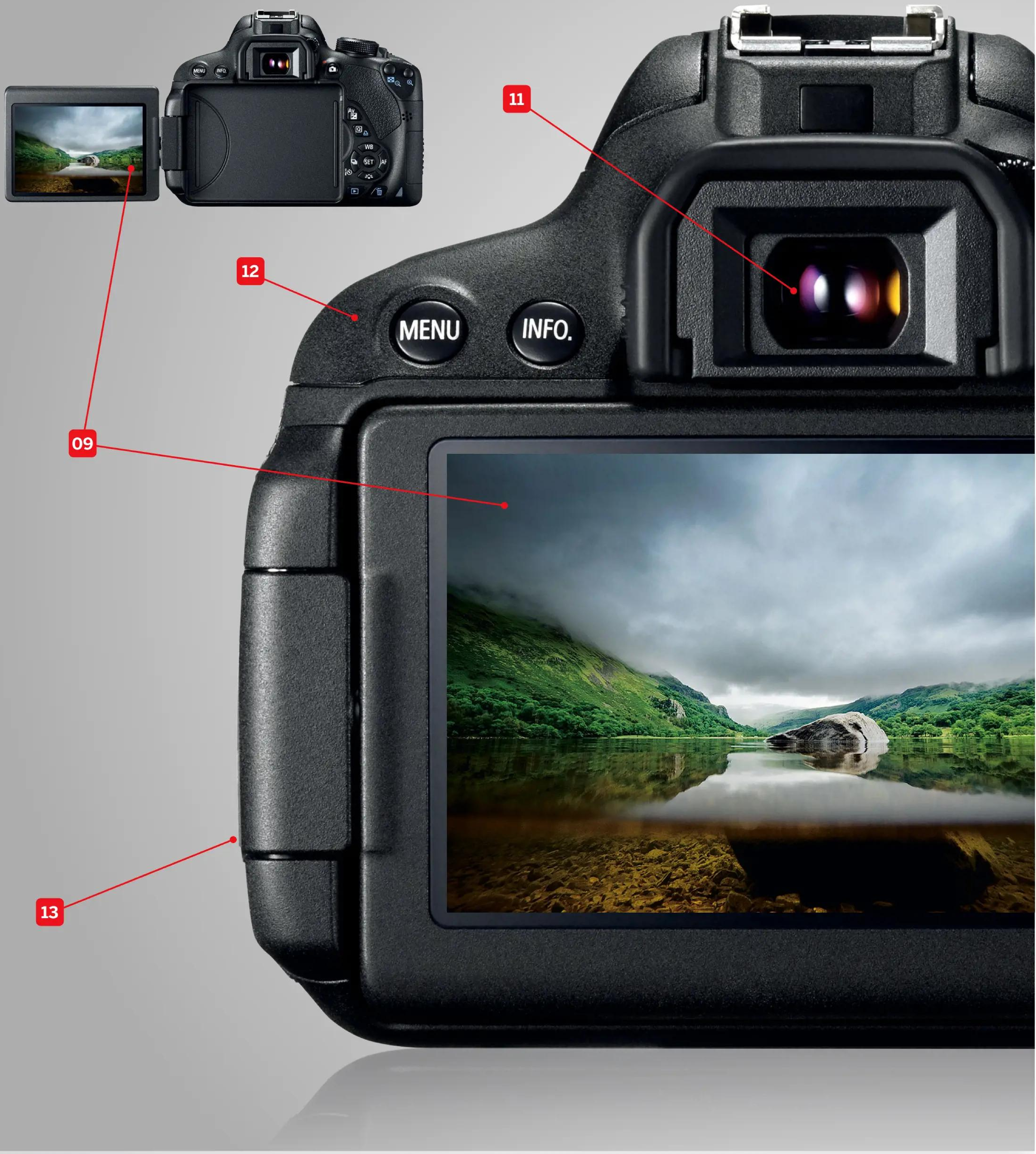
07 HOTSHOE

If you wish to attach an external flashgun, you can do so here. To attach a flashgun, slot it into place and secure it by tightening up the catch on the device.

08 COMMAND DIAL

The command dial is used to alter camera settings and to adjust features.

Round the back…


11
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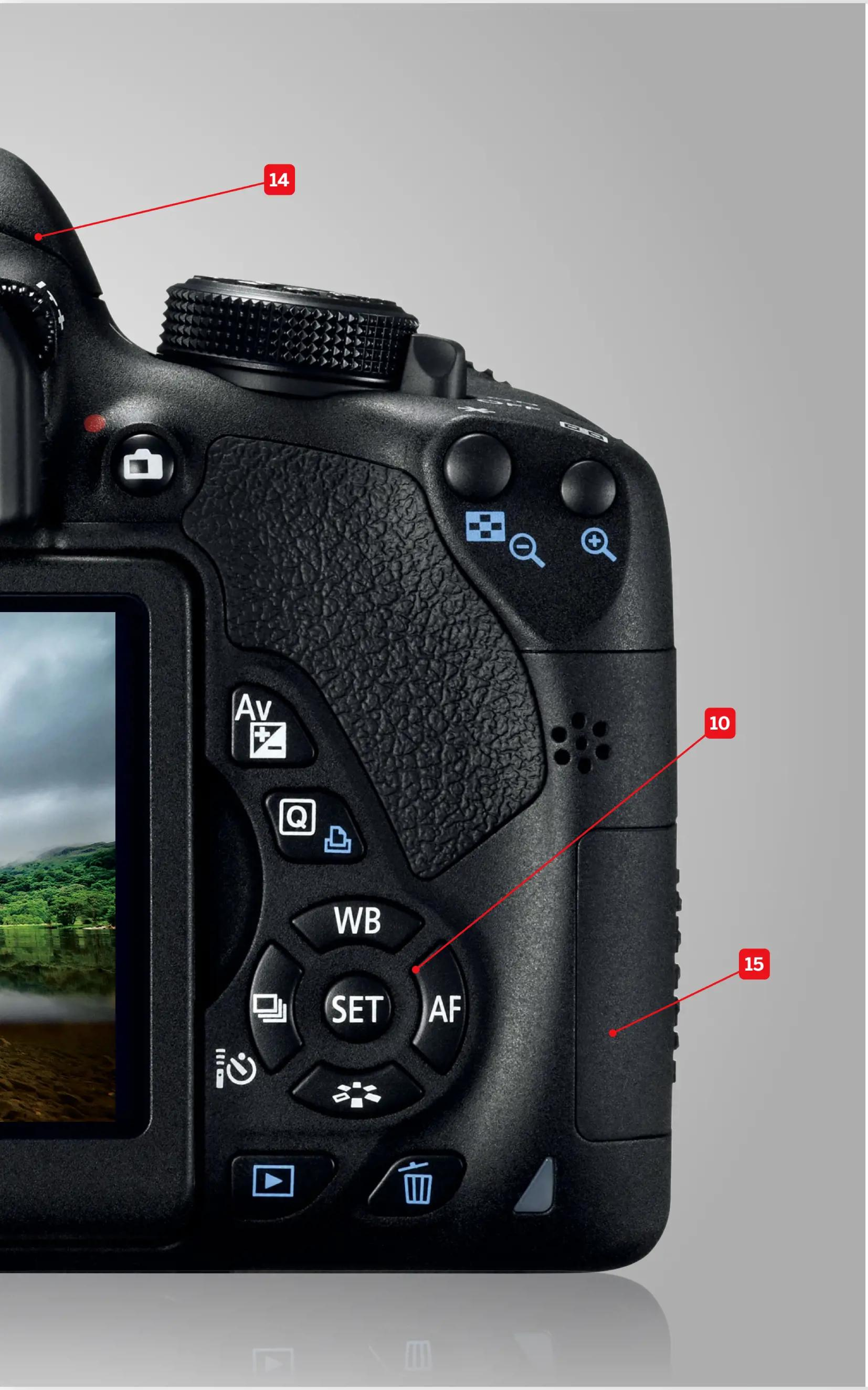


09 LCD SCREEN

The LCD screen has lots of uses, including displaying images while reviewing or composing, and showing shooting information. Some DSLRs, such as this 700D, include a Vari-Angle LCD screen for creative framing.

10 BACK PANEL CONTROLS

The back panel multi-controller is the handy feature you use to alter settings and navigate through the menus. These buttons are also assigned to camera features. If you have a more advanced camera, you may have a mini joystick multi-controller.

11 VIEWFINDER

To compose an image, you look through the viewfinder on the back panel. Next to the viewfinder is the dioptre control, which you can tweak to adjust the screen inside your camera to your vision.

12 MENU AND INFO BUTTONS

To access all the shooting, reviewing and other custom menu options, press the Menu button. The adjacent Info button (Disp on older models such as the 550D) alters feature layouts, and controls some settings options when instructed.

13 CONNECTION POINTS

To connect your camera to another device, such as a computer or a TV set, lift the rubber connection flap and insert the supplied cable into the correct port. You can also connect to a remote shutter release here; handy if you want to take a photo without touching your camera.

14 FLASH

All of the beginner models and some in the enthusiast range include a built-in pop-up flash unit. Handy if you need to shine a bit of extra light on to your subject matter. To activate it, you press the button marked with a lightning symbol. The built-in flash can also be used as a trigger for studio lights or external flashguns.

15 MEMORY CARD SLOT

On the other side of the camera is the memory card slot. Some Canon DSLRs include the memory card slot on the bottom of the camera in the battery compartment.

Start taking control

Discover how to use the main controls that alter your DSLR's settings. Once you get your head around these, you'll find it easier to go out and capture better images!

01 MENU AND INFO BUTTON

Bring up the main menu system by pressing Menu. From here you can access camera, review and tool settings. The Info button (next to Menu) enables you to alter feature display settings. On older models, such as the 550D, you'll have a Disp button that performs the same function as the Info control.

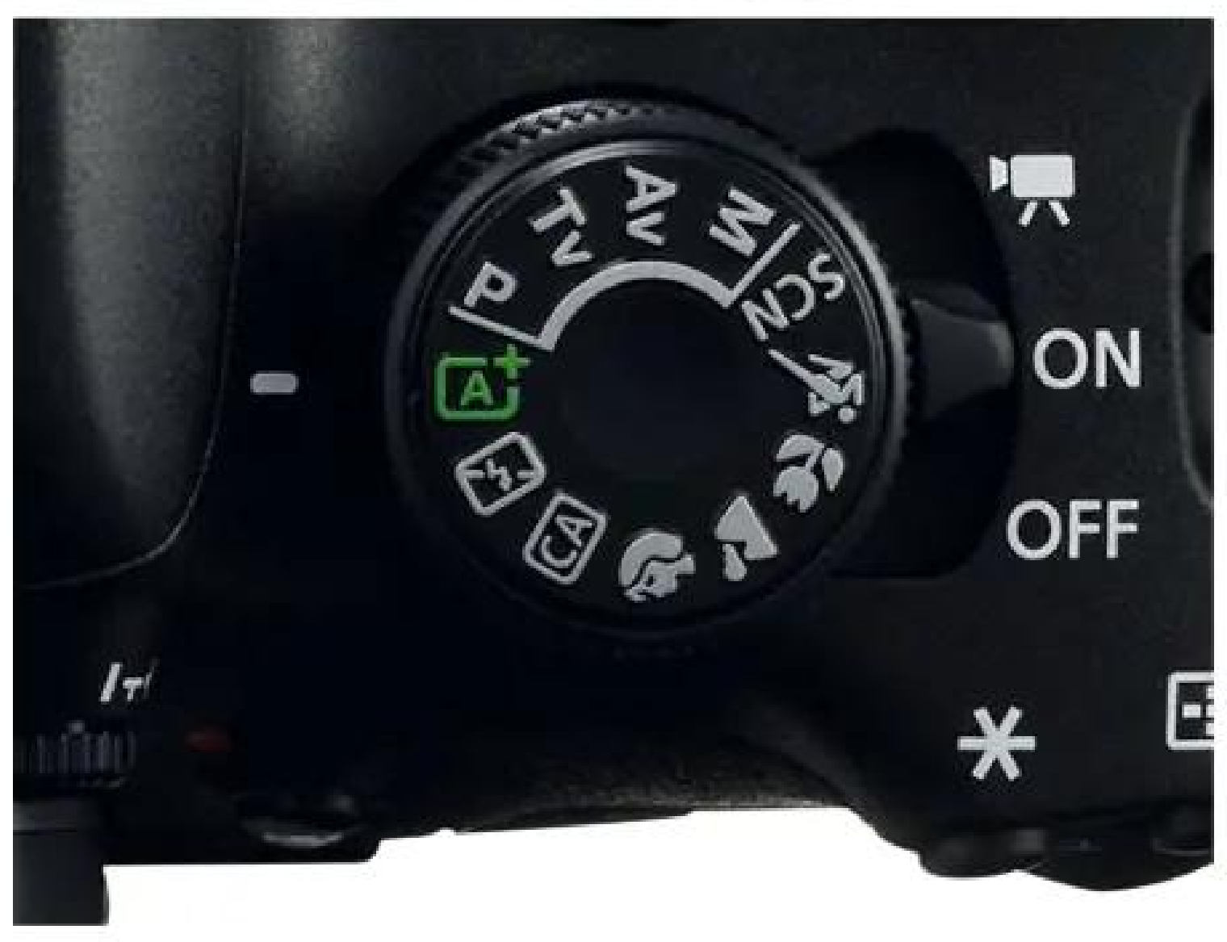
02 SHUTTER RELEASE

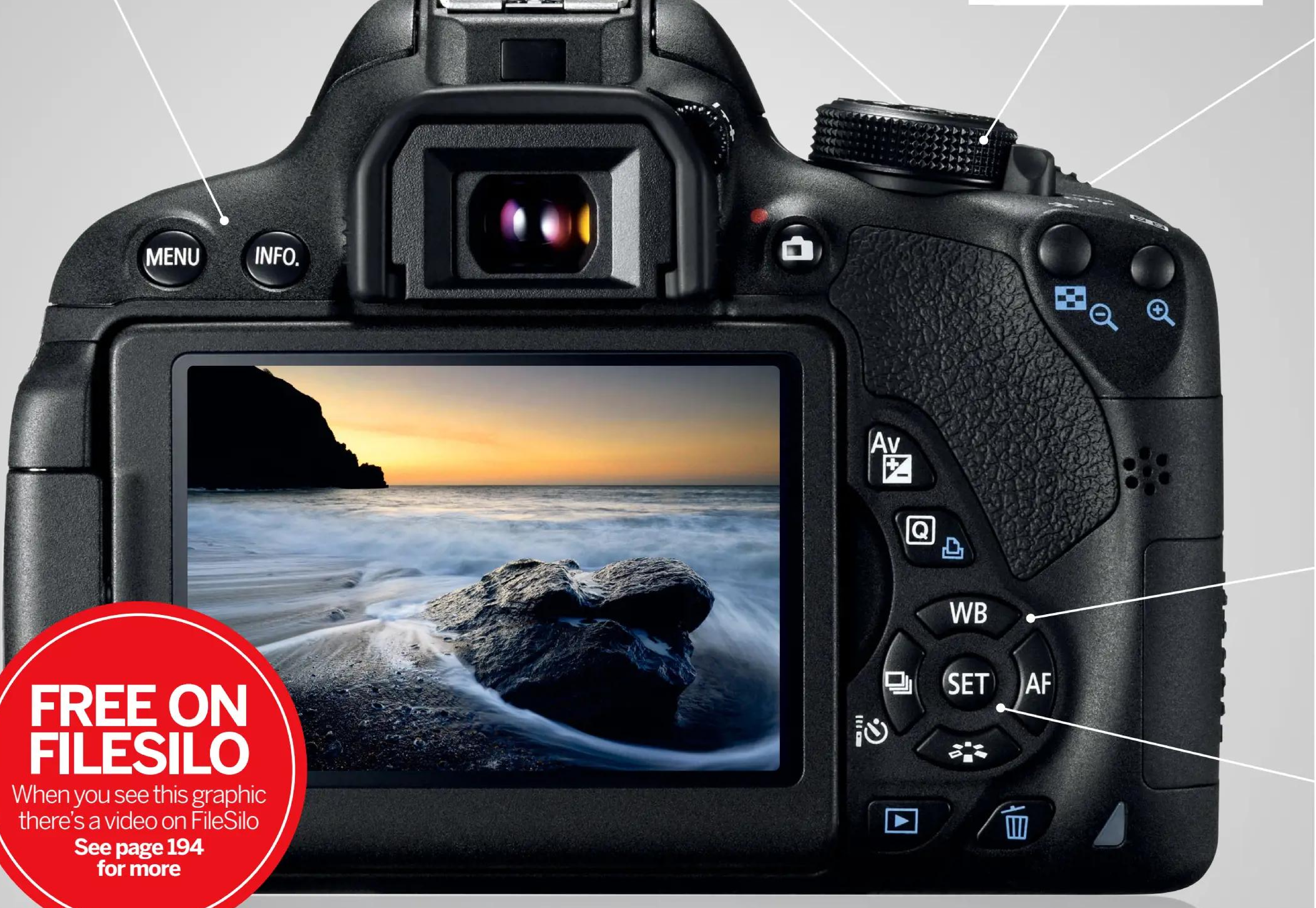
To take a photo you need to press the shutter-release button situated on the top panel of the camera at the front. Half pressing it enables you to focus the image and meter the scene.

STABILIZER
ISO

03 MODE DIAL

The mode dial is a key control. It's where we access all our shooting modes, and how we tell our camera what we want it to control and what we're going to alter manually. The Full Auto mode is marked by a green square. With this mode, the camera will select all of the camera settings for you. Here you can also access Scene modes. For those wanting more control over their DSLRs, there are four creative modes, indicated by P, Tv, Av and M.





FREE ON FILESILO

When you see this graphic there's a video on FileSilo

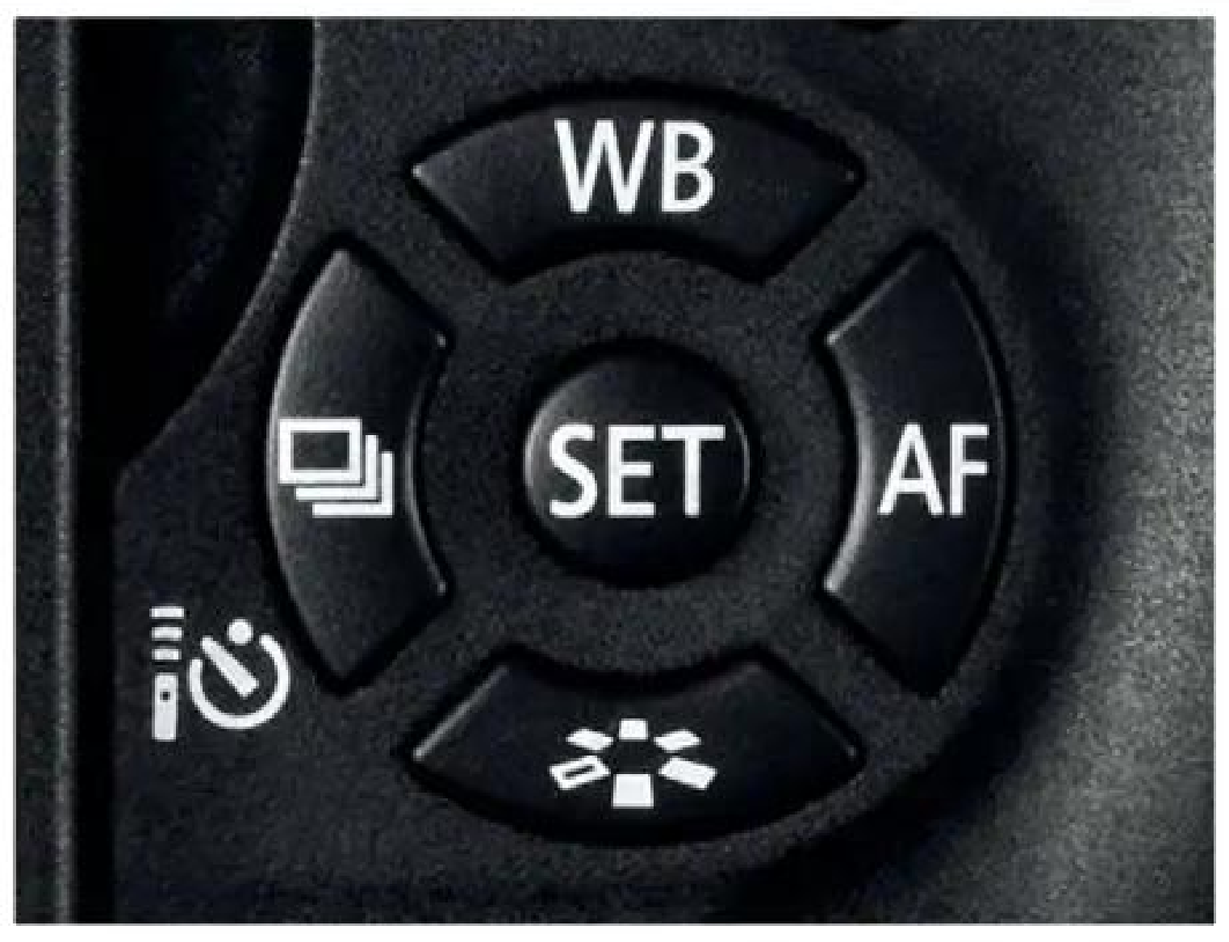
See page 194 for more

04 MAIN COMMAND DIAL

In front of the mode dial we have the main command dial. We use this dial for a number of purposes including adjusting camera settings quickly.

05 MULTI-CONTROLLER

On many of the beginner Canon DSLRs, the back-panel multi-controller consists of four buttons in a circle formation. These controls have a multitude of functions including navigating through the menu system. The buttons are also assigned individual functions, such as the Picture Style, white balance, and AF control settings.

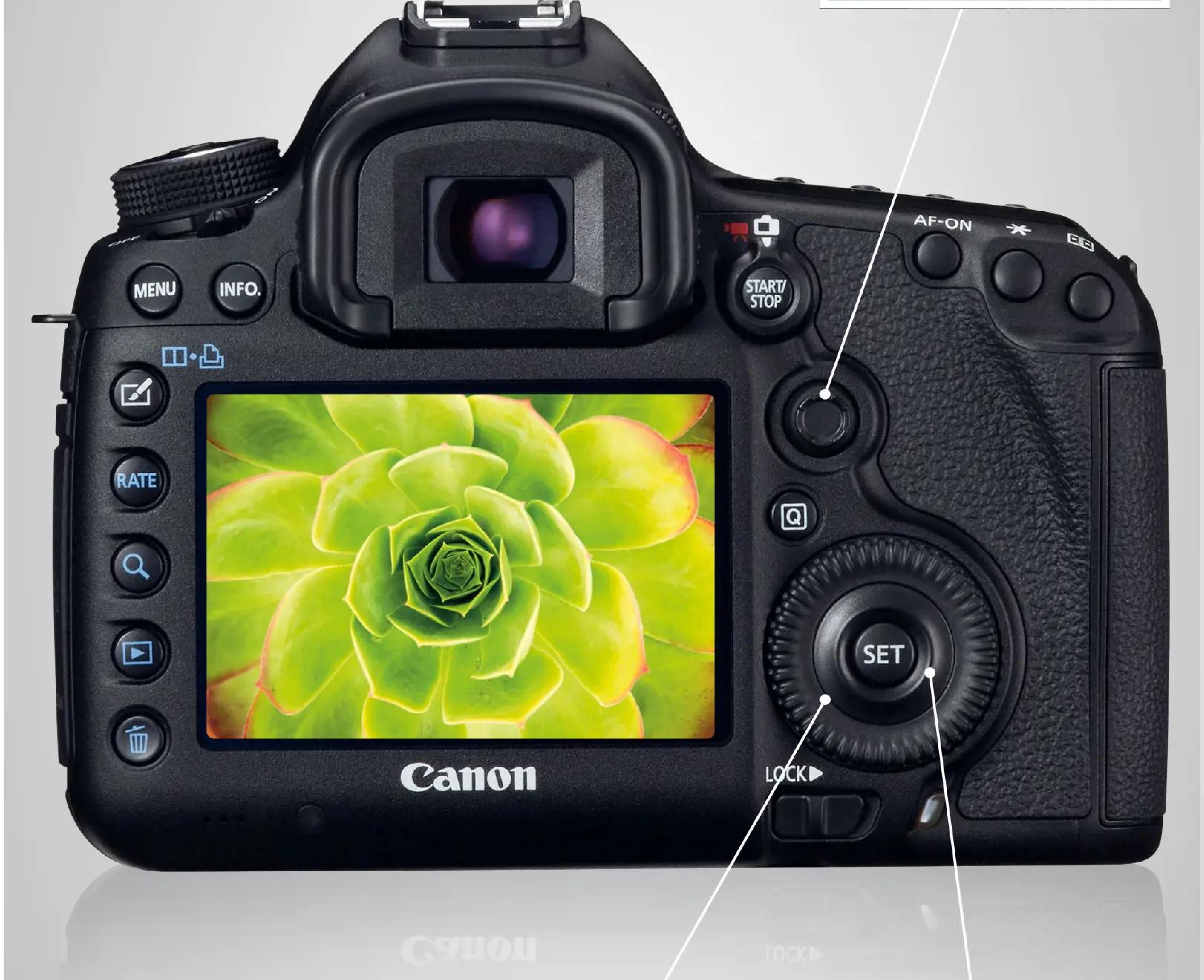


06 SET BUTTON

Situated in the centre of the multi-controller buttons, you use the Set button to select features and change settings.

Advanced models

Some of the models from the enthusiast and professional ranges use a slightly different back-panel multi-controller setup…



02 MINI JOYSTICK

The mini joystick controller is only found on some enthusiast- and professional-level Canon DSLRs. You use it in conjunction with the multi-controller dial to navigate through settings and menu systems.

01 MULTI-CONTROLLER

If you have an enthusiast- or professional-level Canon DSLR body, the back-panel multi-controller is a bit different. You have this dial that you can use to navigate through settings and the menu system.

03 SET BUTTON

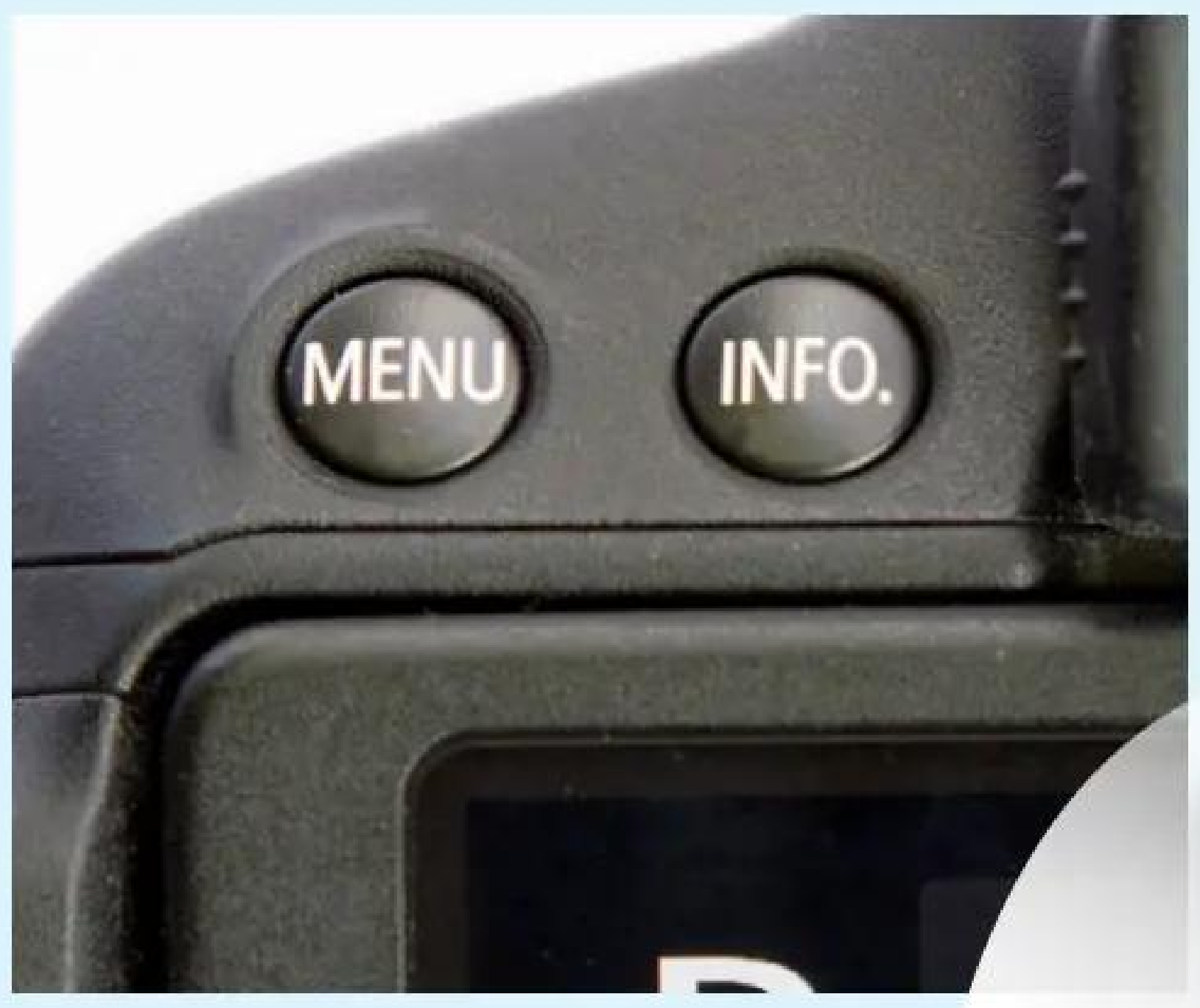
The Set button is situated in the centre of the dial. Press it to select various menu options and alter camera settings.

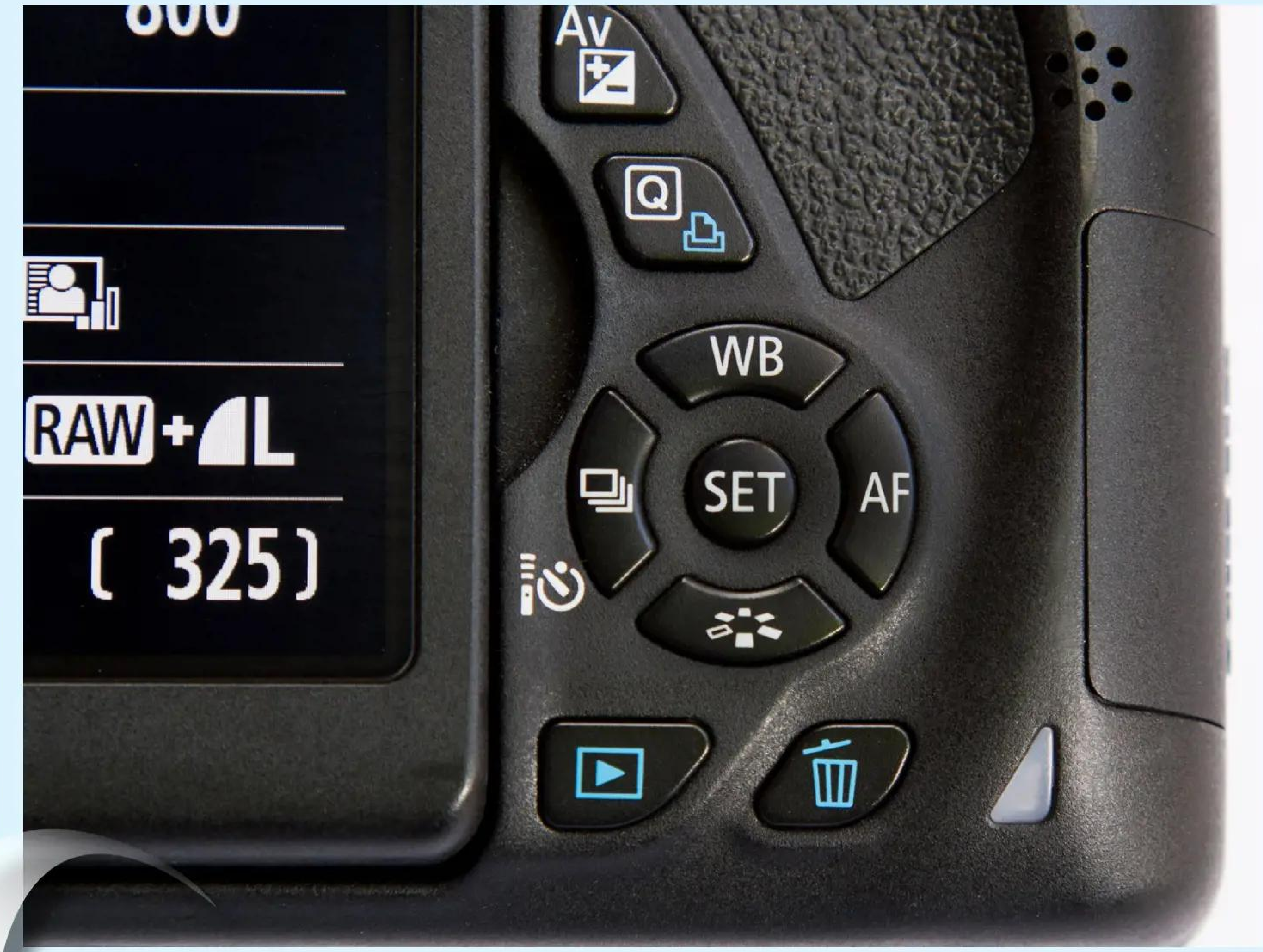
Navigate the menus

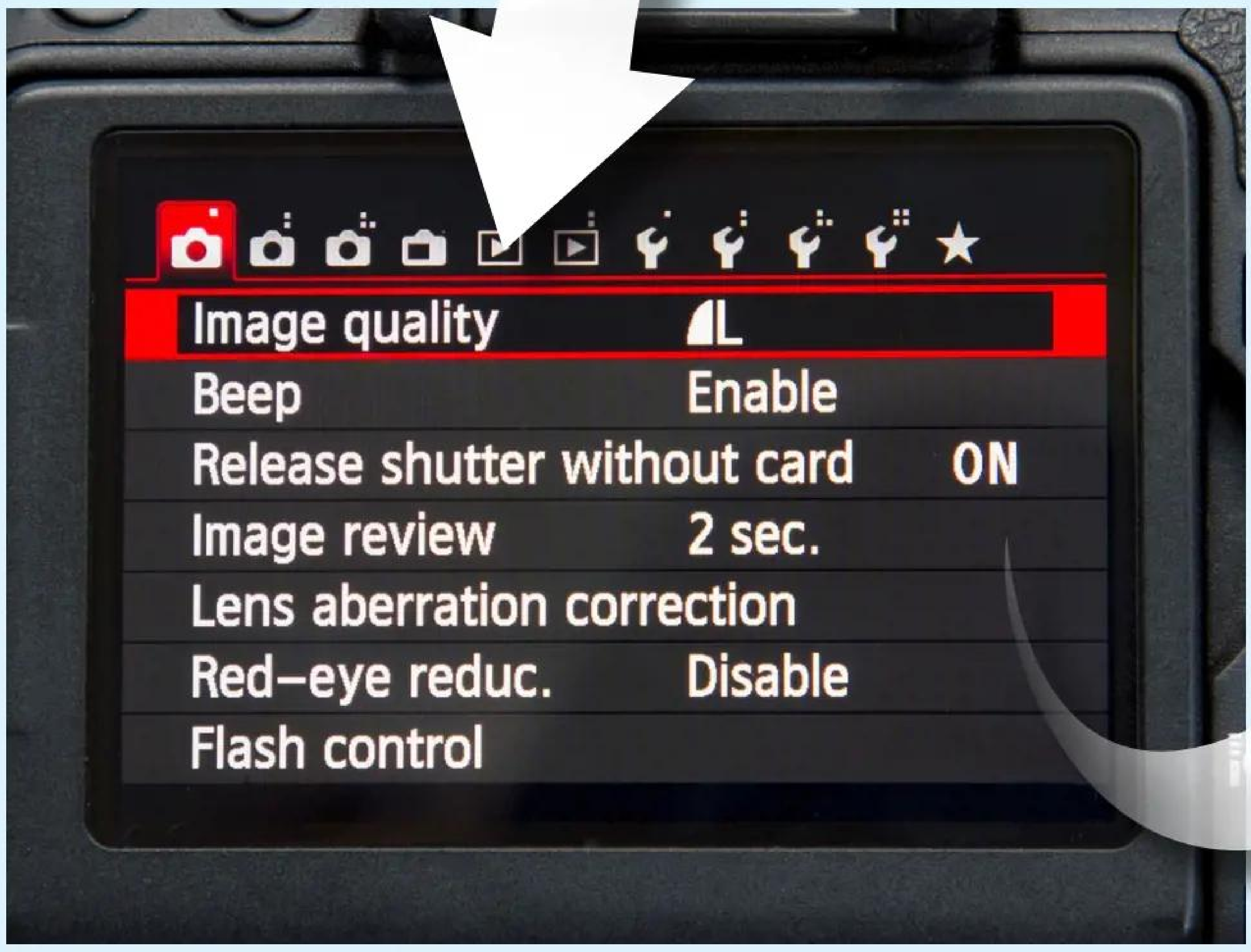
Find what you're looking for fast using your DSLR's menu system

1 Menu button and controls

We can access lots of features and settings through the buttons on the camera, but we won't find them all. To see everything, we need to head in to the main menu system. This may seem a bit overwhelming when you first hit the button, but it has been systematically divided to make it easy to navigate the options. To access the menu, press the Menu button. To navigate, use the back-panel multi-controller. Once you've highlighted a feature, press Set to access and adjust.







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Beep	Enable
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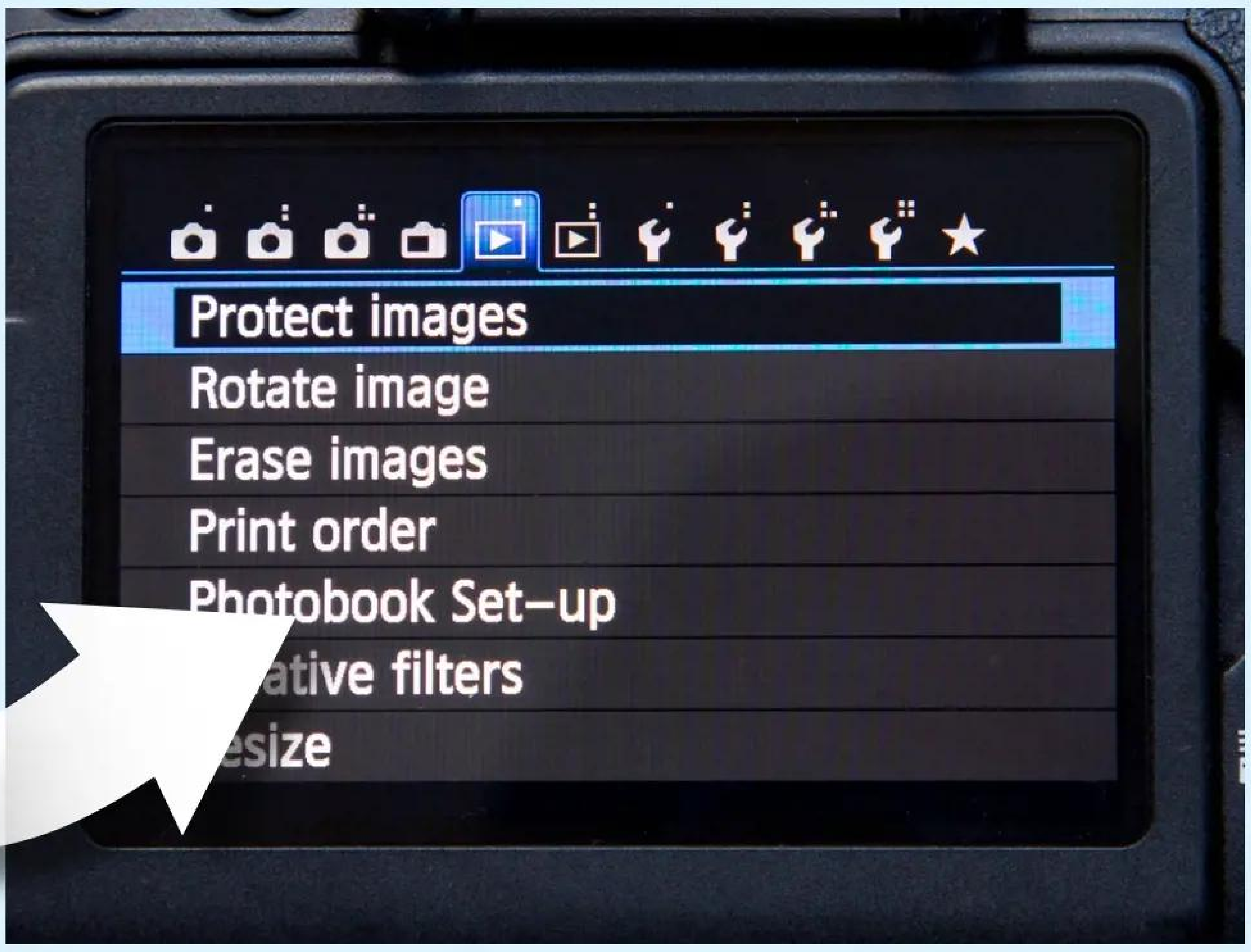
Image review	2 sec.
Lens aberration correction	
Red-eye reduc.	Disable
Flash control	

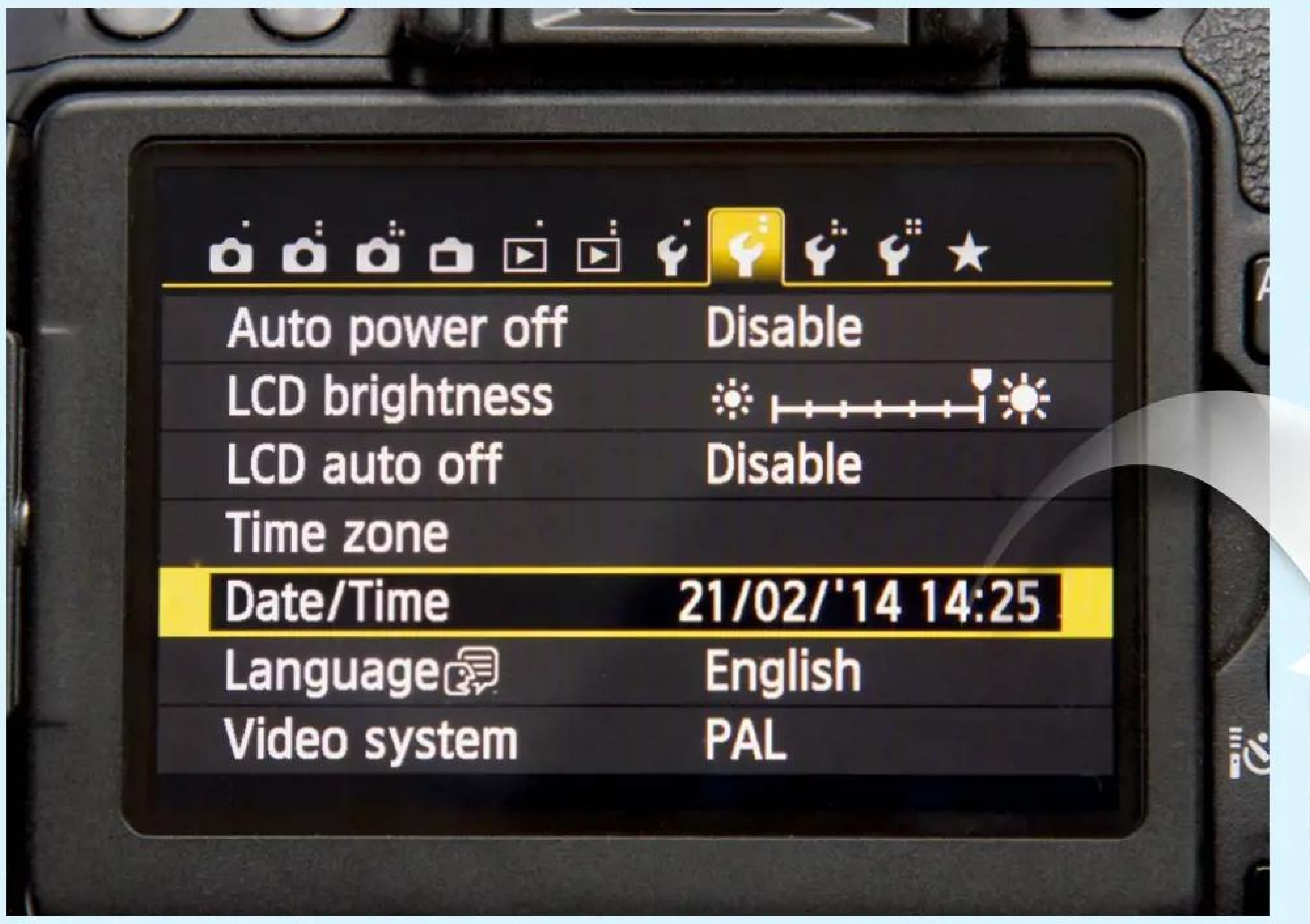


2 The red section

The first section is labelled with a red camera icon. This section contains all the shooting features. So, for instance, if you want to set the image quality, the Picture Style, or the custom white balance setting, you can do so here. After the camera settings are the Live View options. This is also labelled with a red camera, but the small menu icon shows the back of the camera.

3 The blue section

In the blue section you'll find all the settings for reviewing images. This includes the options to protect, rotate and erase photos. One of the most useful tools here is the Image Jump option. Here you can assign the command dial to jump through images ten at a time when reviewing. You can also elect to review your video clips.



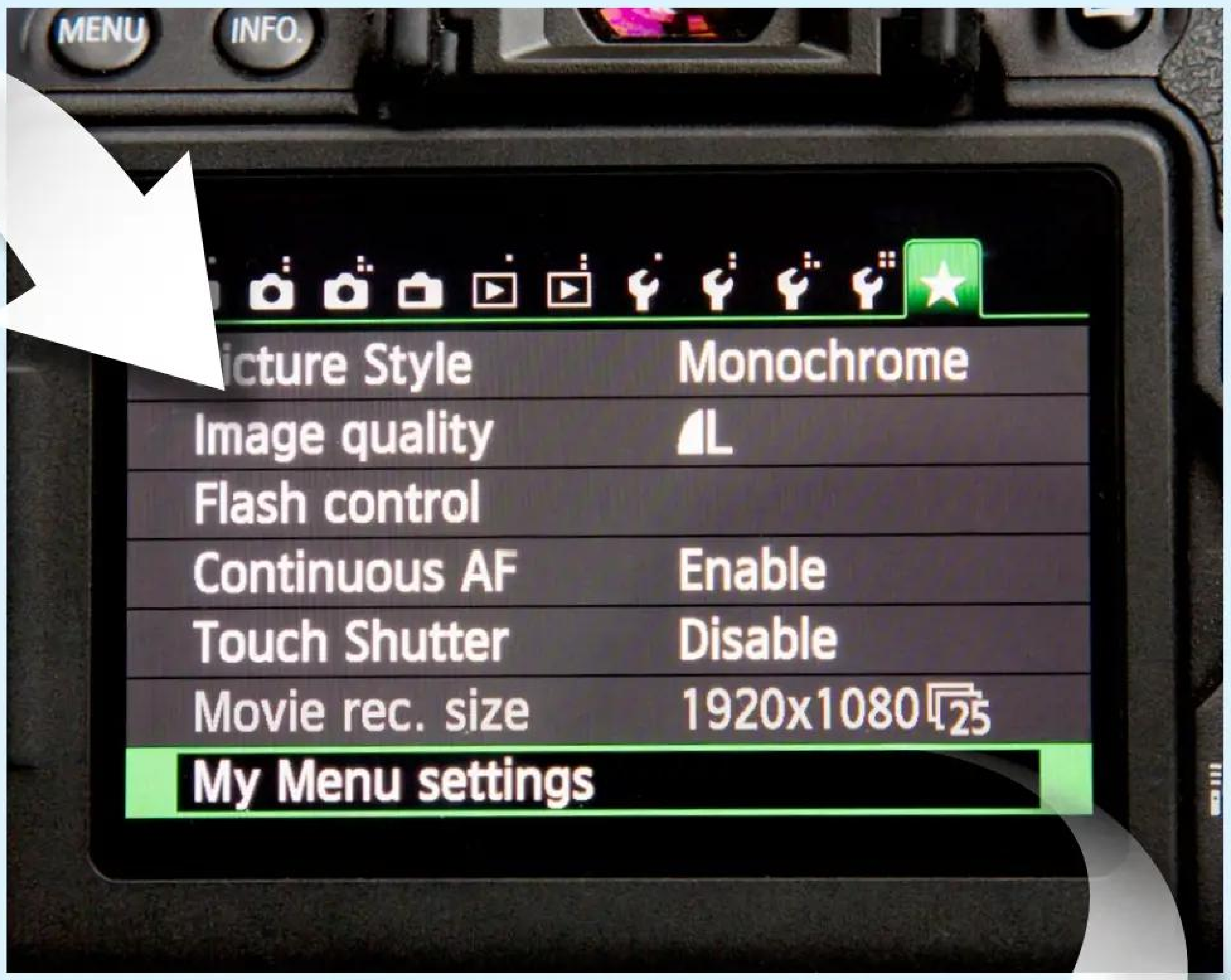
Auto power off	Disable
LCD brightness	
LCD auto off	Disable
Time zone	
Date/Time	21/02/'14 14:25
Language	English
Video system	PAL

4 The yellow section

In the yellow section you'll find all the camera's tools. This is indicated by the small spanner symbol. Here you can set the time and date, format the memory card, and update the camera's firmware. You can also perform tasks such as altering the LCD screen brightness and colours. There's also a useful setting called Clear settings, where you can reset your DSLR back to the factory default setup.

5 The green and orange sections

To access My Menu you need to head into the green part of the menu section at the end. If you have a more advanced model, your camera may also have an orange custom camera settings section. Here you can create a bespoke setup for your DSLR by assigning buttons on the camera to perform different tasks. ■



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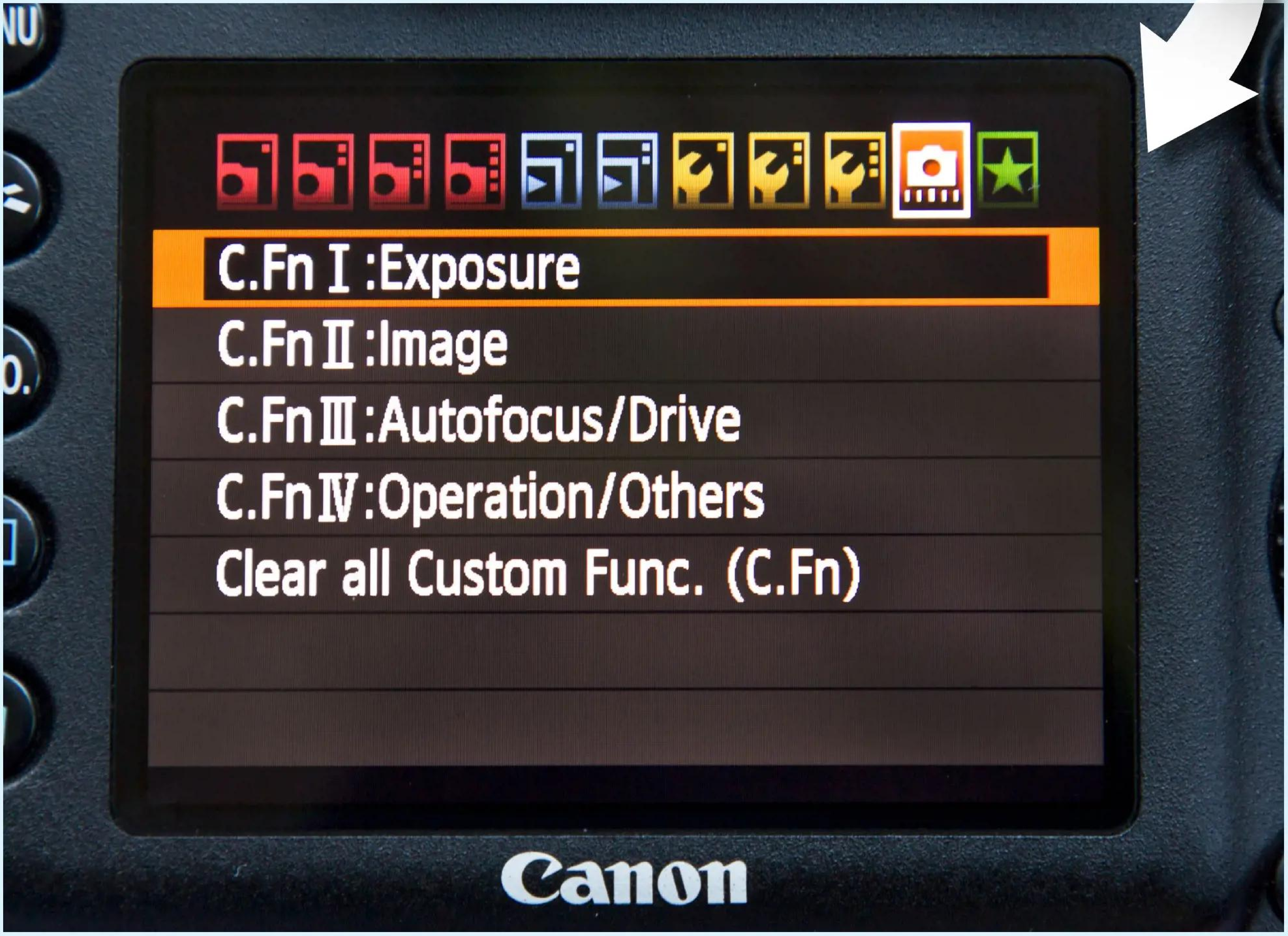
Touch Shutter	Disable
Movie rec. size	1920x1080 25
My Menu settings	



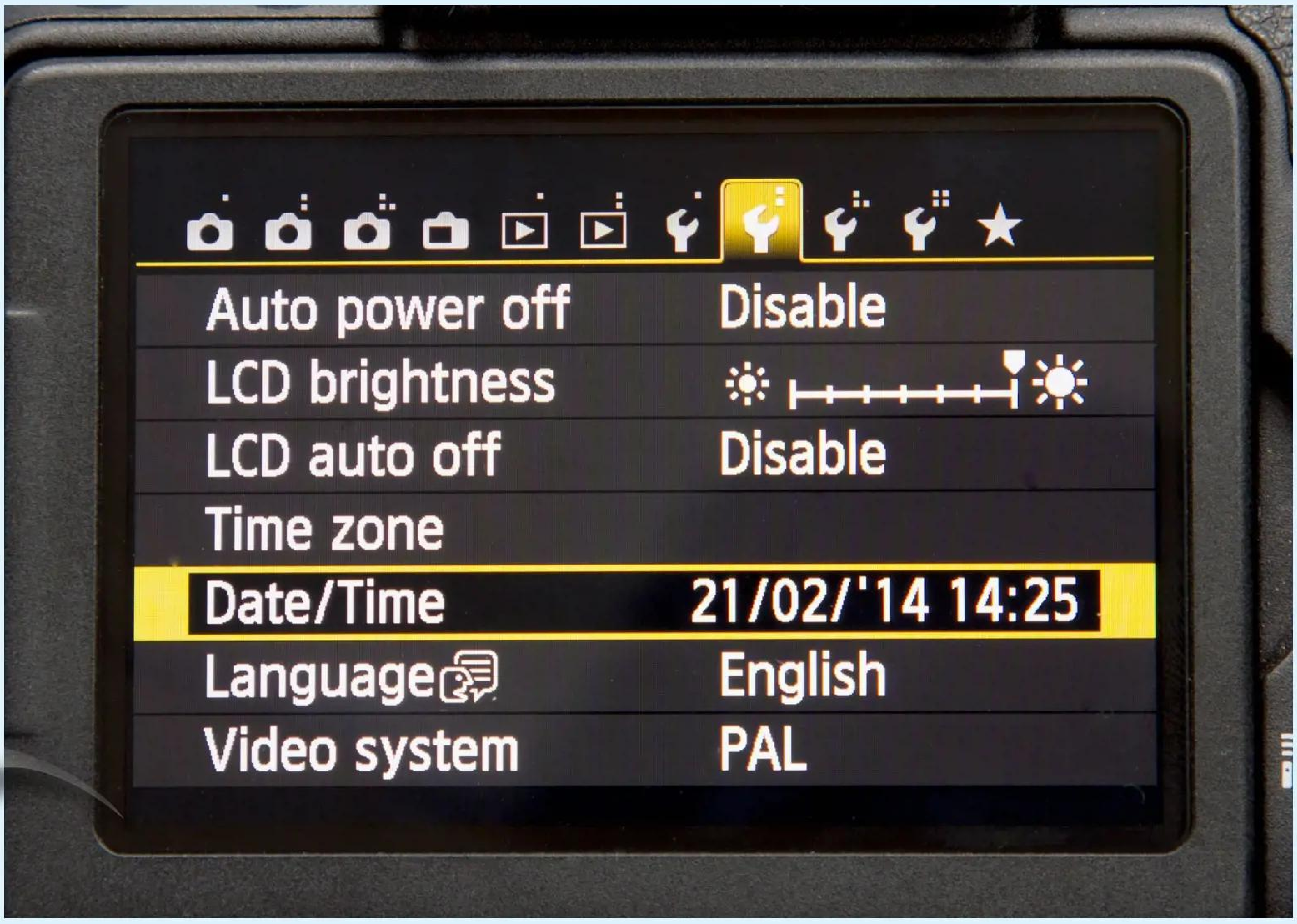
C.Fn I :Exposure
C.Fn II :Image
C.Fn III :Autofocus/Drive
C.Fn IV :Operation/Others
Clear all Custom Func. (C.Fn)

Set the file options

Format your memory card, set the time, and define the image quality

1 Set the time and date

It may not seem a high priority right now, but it's vitally important before you start shooting to set the time and date. It can be a real help later on when you're trying to search for an image. Press the Menu button and navigate to the yellow section. This is where you'll find all the camera's tools. Navigate to the Date/Time option using the multi-controller, and press Set. Now all you need to do is work through the options using the multi-controller and Set button.



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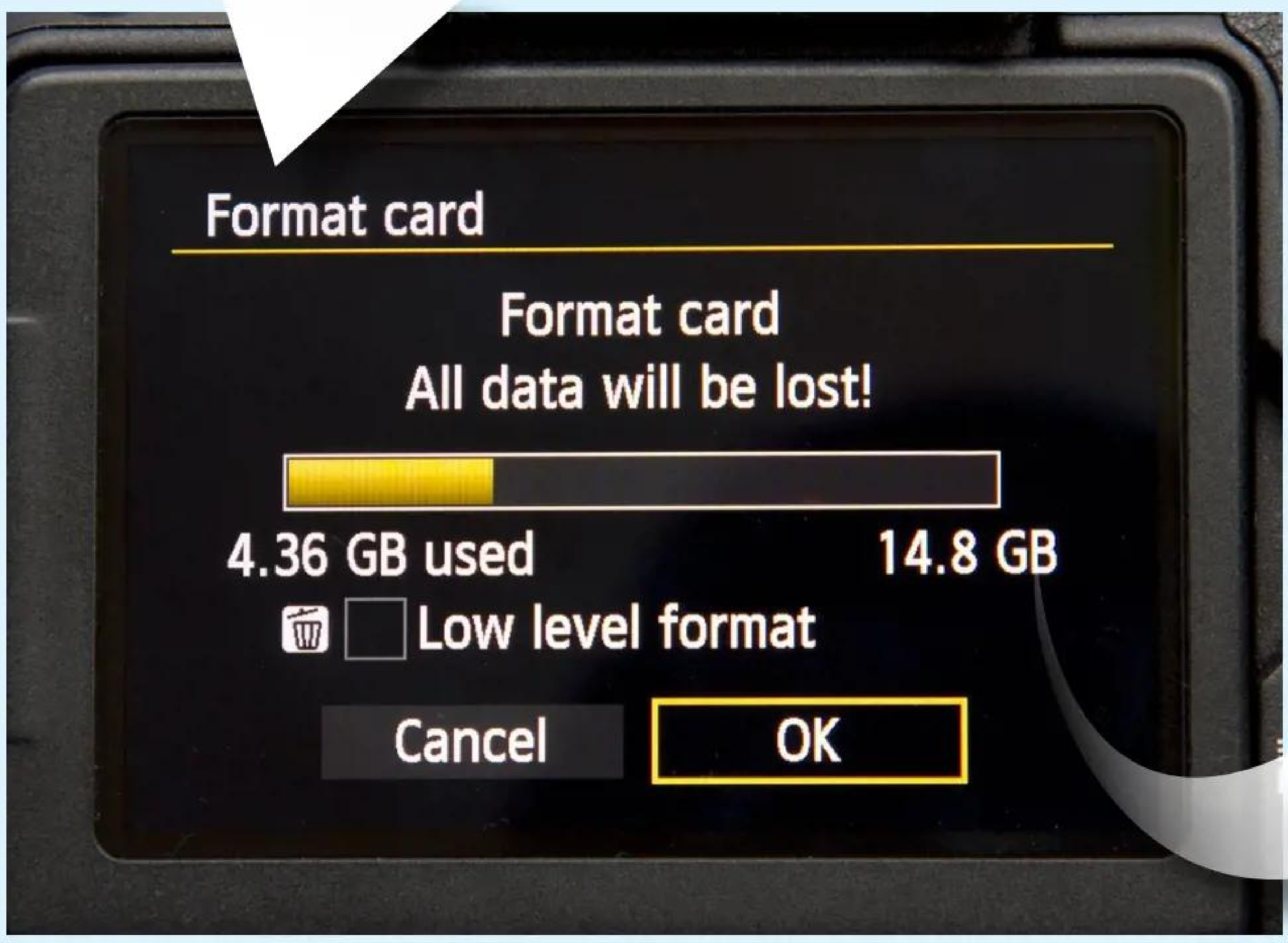
LCD brightness
LCD auto off Disable
Time zone
Date/Time 21/02/'14 14:25
Language English
Video system PAL



Format card

Format card
All data will be lost!
4.36 GB used 14.8 GB
☐ Low level format
Cancel OK

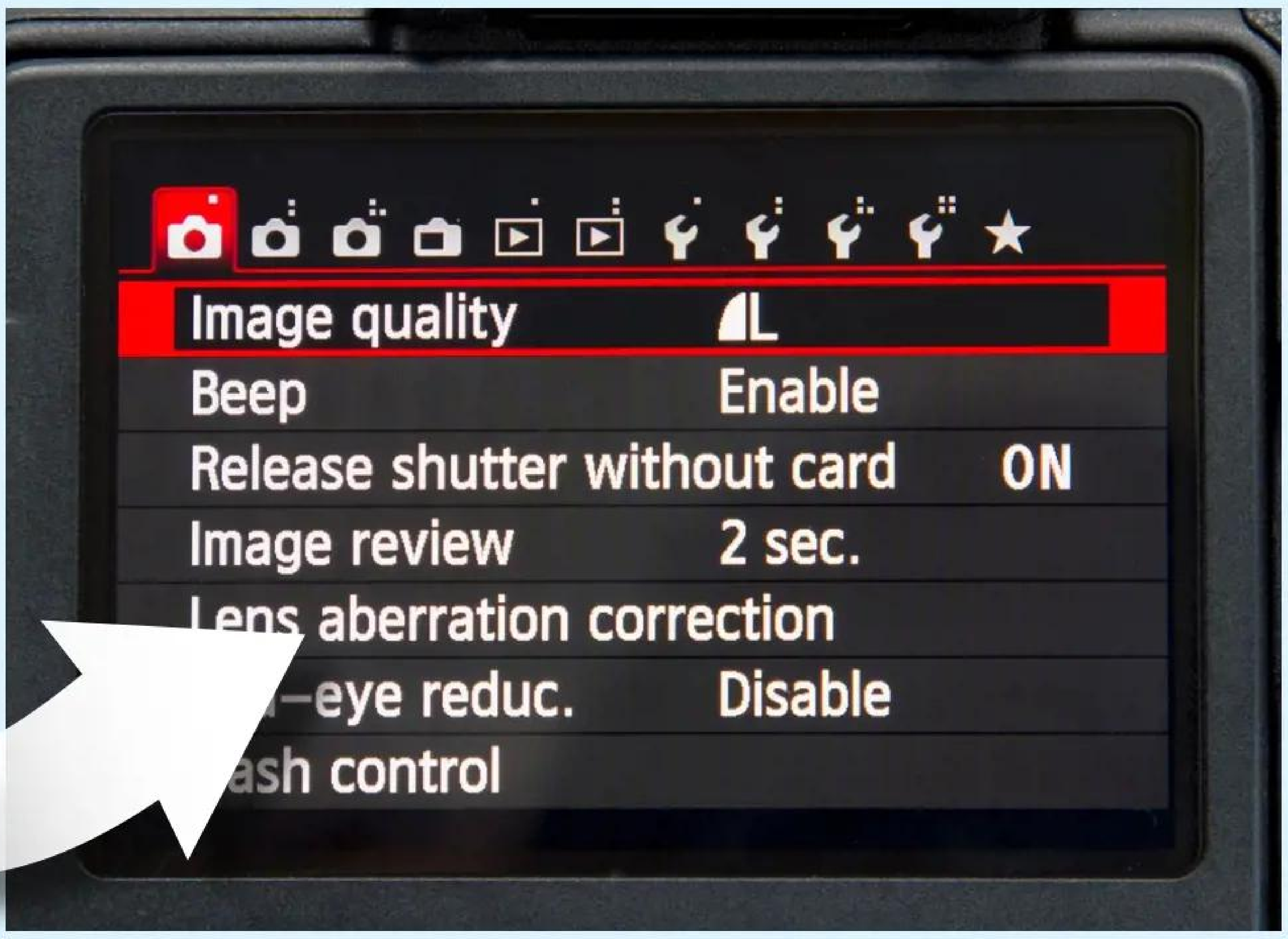


Image quality L
Beep Enable
Release shutter without card ON
Image review 2 sec.
Lens aberration correction
-eye reduc. Disable
ash control

2 Format the memory card

While we're in the yellow set-up section, it's worth using the function that deletes everything from the memory card. This is called formatting. Just remember to save everything from that memory card before you format it, because it will wipe the card clean. Find Format from the list and press Set. Then change the setting to OK to complete the operation.

3 Choose the image quality

Next you need to set the image quality. Find Image quality at the top of the red camera settings section. You have two options to choose from here – JPEG or raw. A raw file is an uncompressed image, which looks best once processed. A JPEG is a smaller, compressed file. These are good for beginners because you don't have to worry about processing the images.

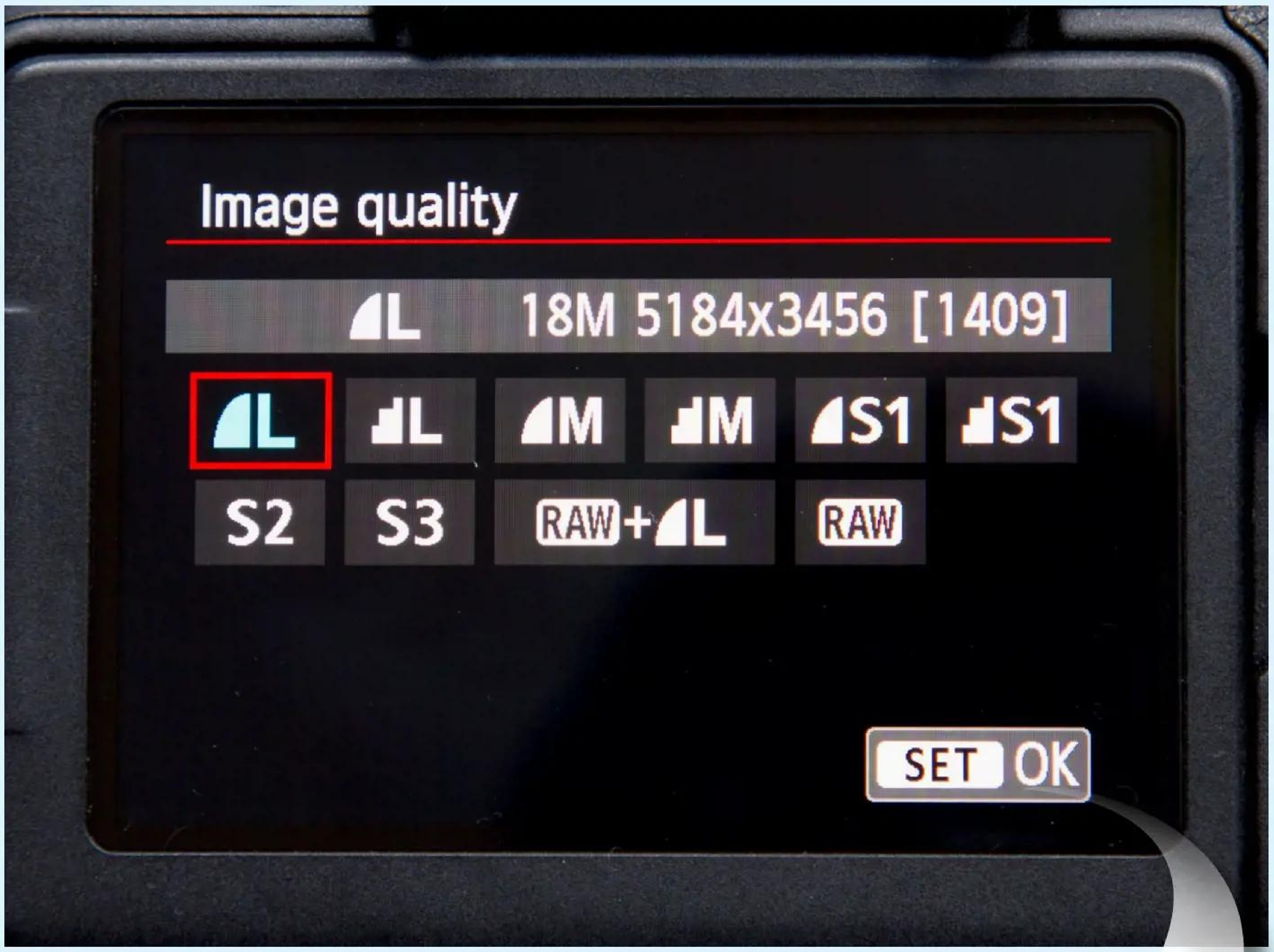


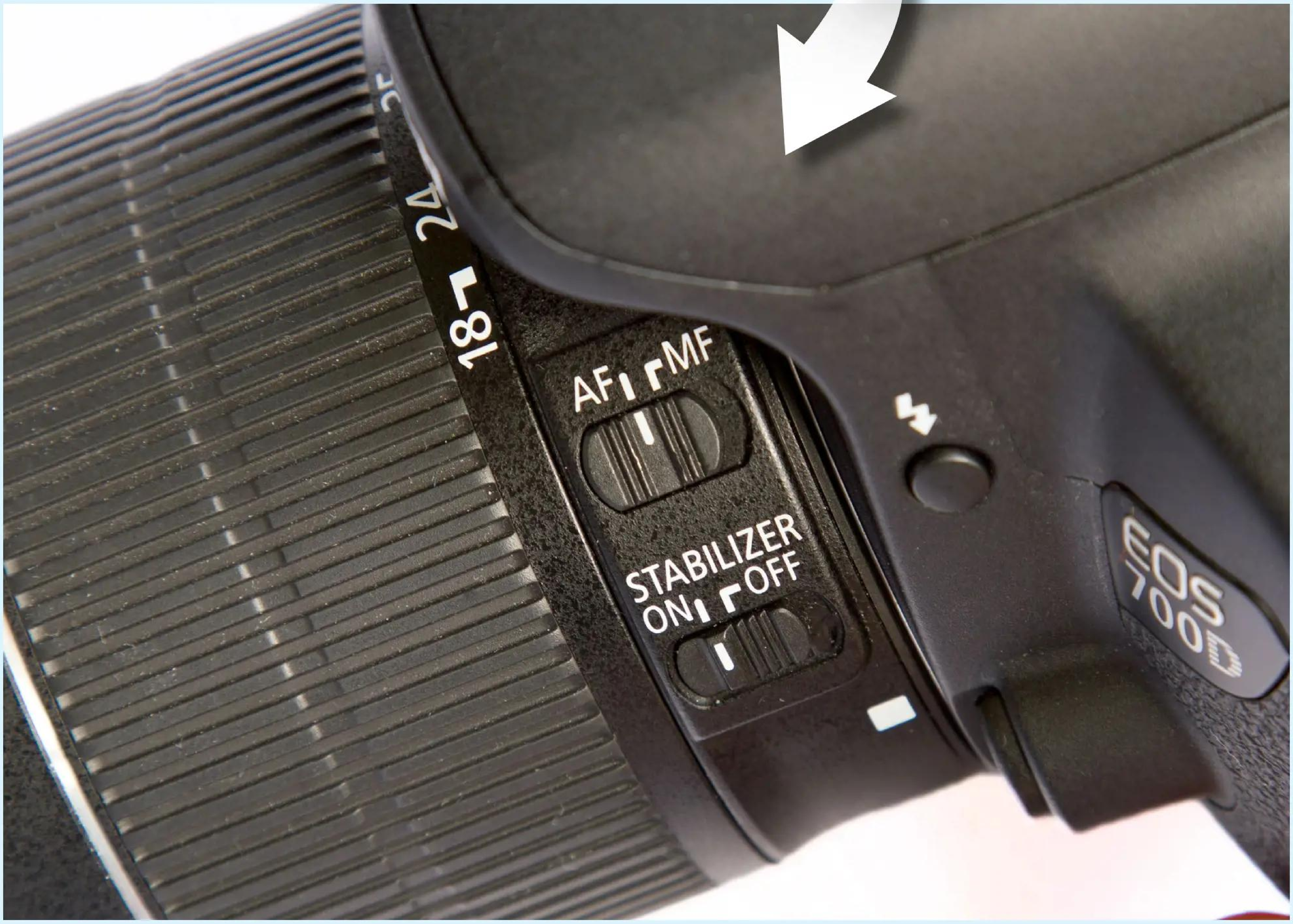
Image quality
L 18M 5184x3456 [1409]
L
L
M
M
S1
S1
S2
S3
RAW+L
RAW
SET OK

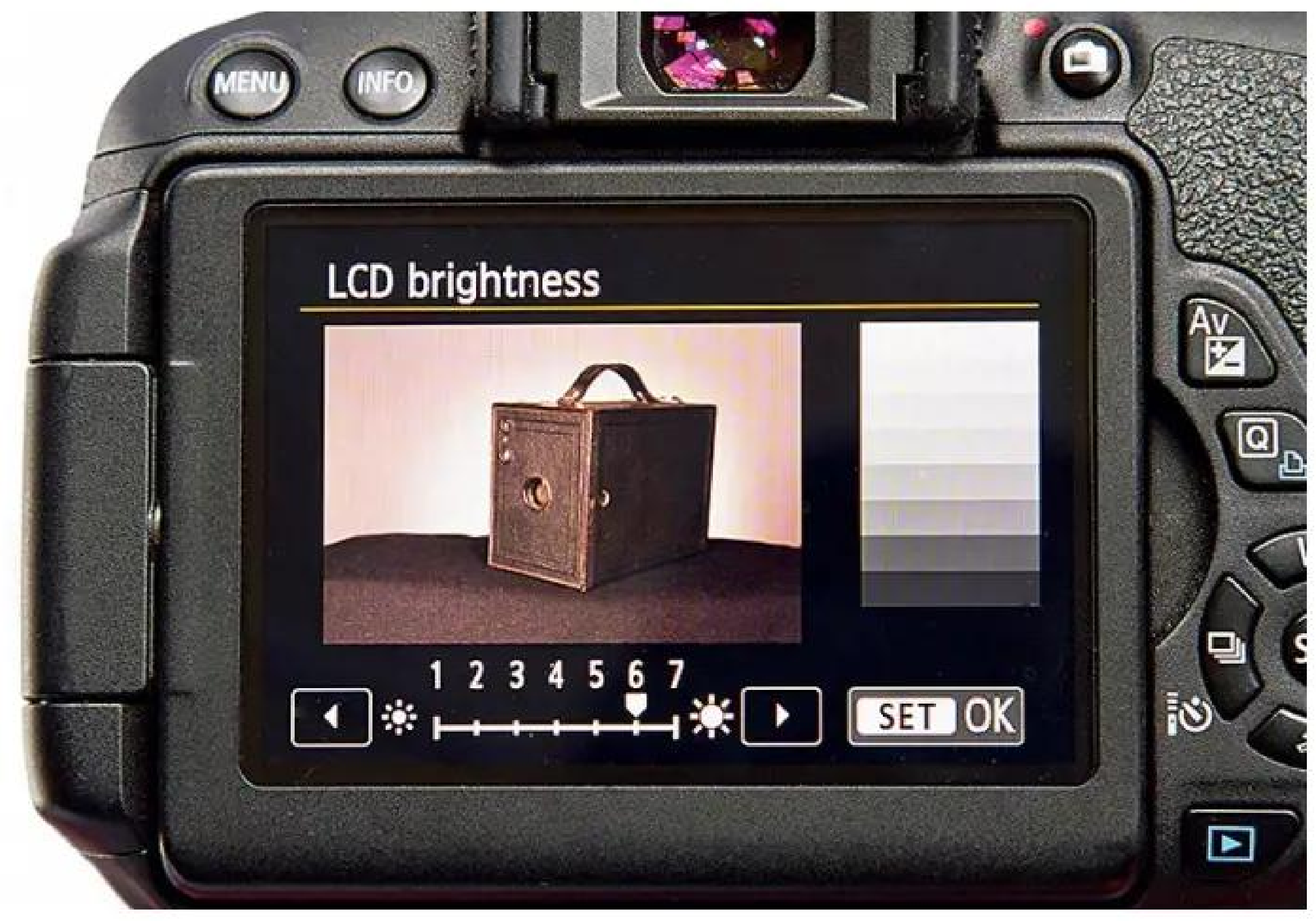
4 Set the image quality

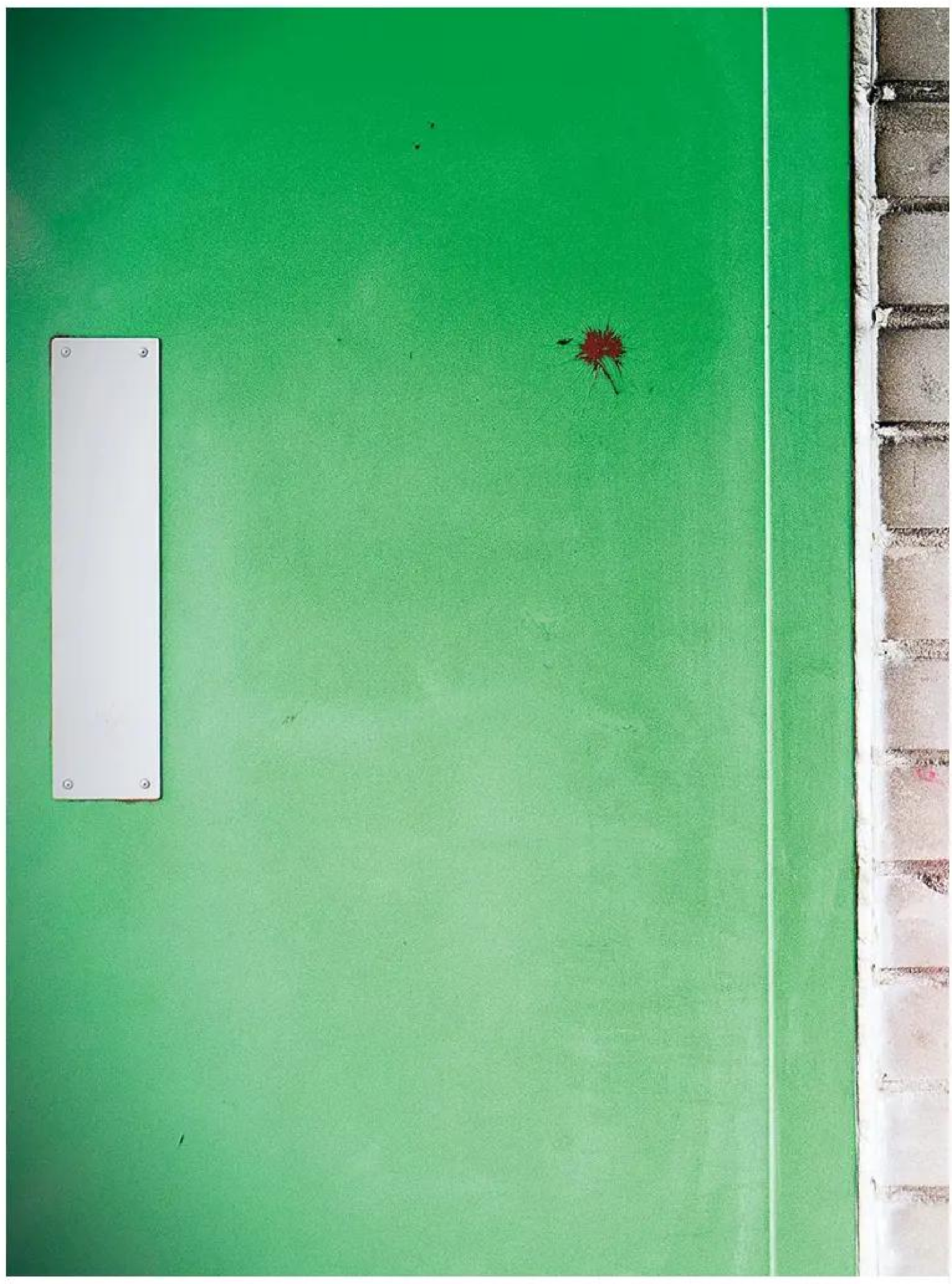
To get started, set the image quality setting to the large JPEG option. This is the one that's illustrated by a big curved symbol. You can move to the raw format once you start feeling more confident with the camera and with processing software. There's also the option to shoot both raw files and JPEGs. Just be aware that this option will consume more of your memory card space and computer hard drive space.

5 Set the lens to AF

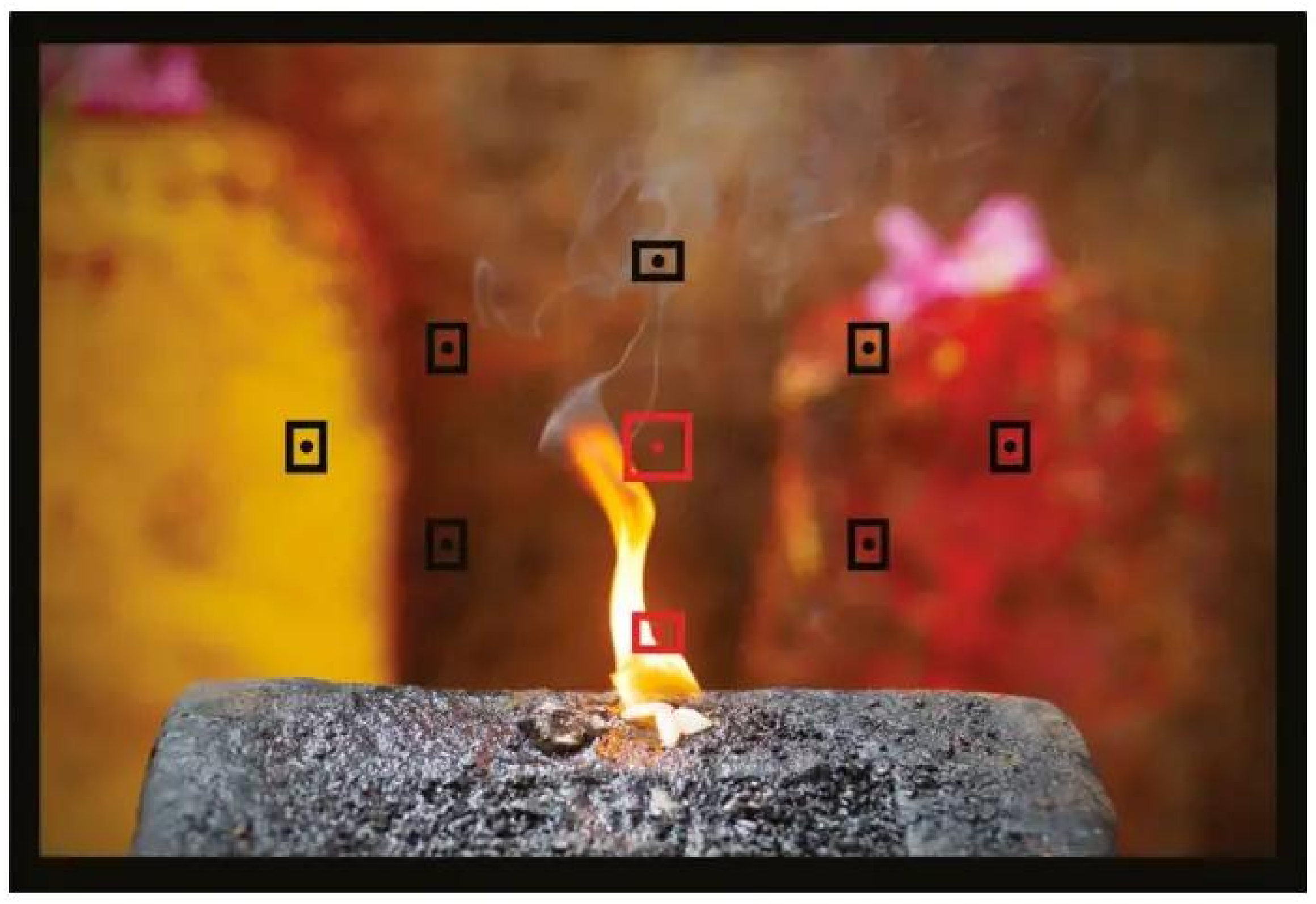
Finally, make sure your lens is set to the AF setting. AF stands for autofocus, and in order to make it easier for you to take a photo, it's best to use this setting. Your DSLR will beep when the image is in focus. If you wish to switch off this alert (you may want to be more inconspicuous) you can do so in the red camera section in the main menu, under Beep.


18
24
AF
MF
STABILIZER
ON
OFF
EOS 700D


MENU
INFO
LCD brightness
1 2 3 4 5 6 7
SET OK
Av



MENU
INFO.
P
ISO 800
-3..2..1..0..1..2..+3
±0
AWB
ONE SHOT
Auto
Av
Q
WB
SET



Drive mode
Continuous shooting
SET OK

Learn essential camera techniques

Vital camera techniques you need to learn, from using the viewfinder and Live View to adjusting settings

24 **Introducing the viewfinder and Live View mode**

Learn how to read the information displayed under the image in the viewfinder, and how to activate the Live View mode

30 **Adjust camera settings quickly**

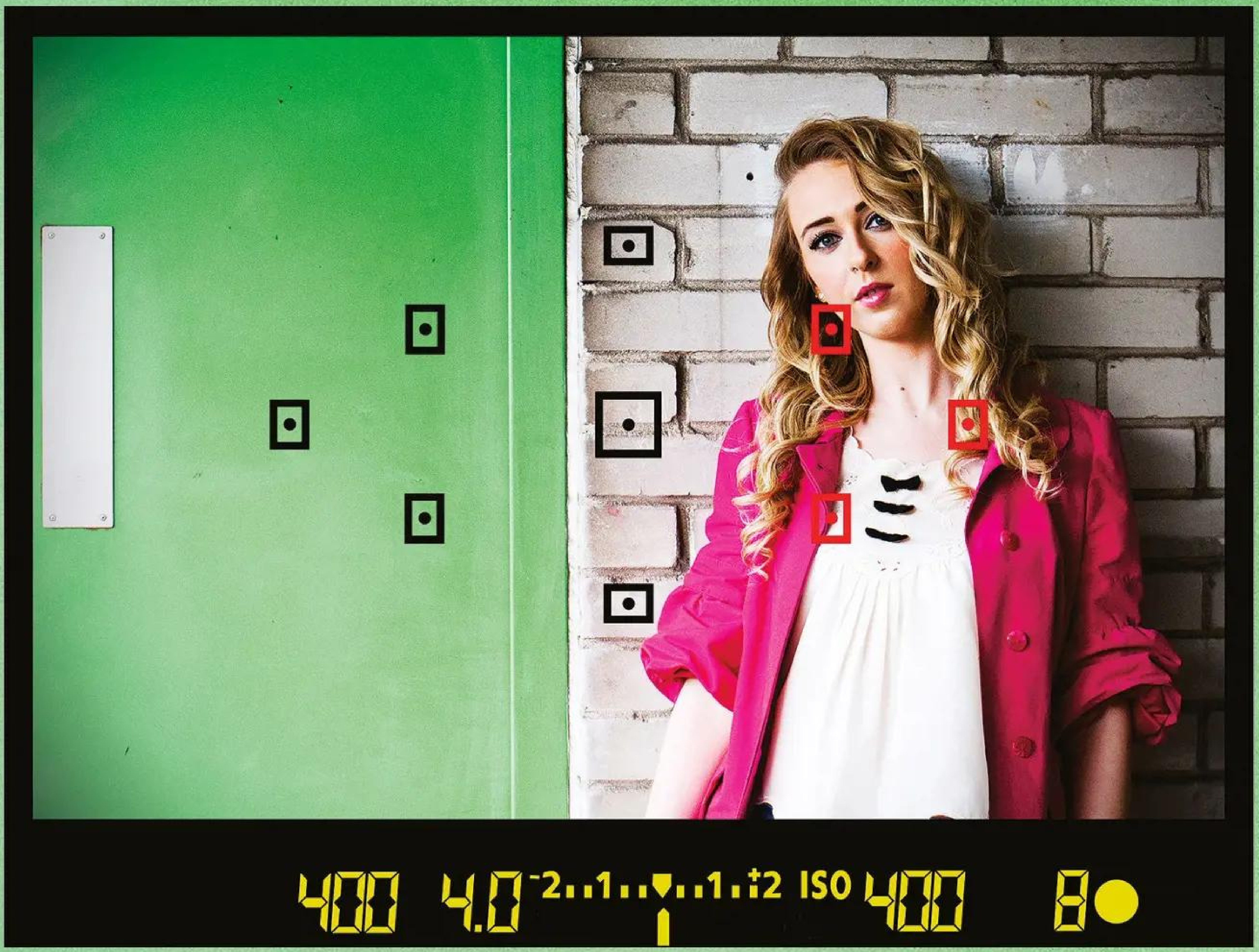
Navigate and alter camera settings quickly using the Quick Control screen on the back-panel LCD

Introducing the viewfinder

Learn how to read the information displayed under the image in the viewfinder

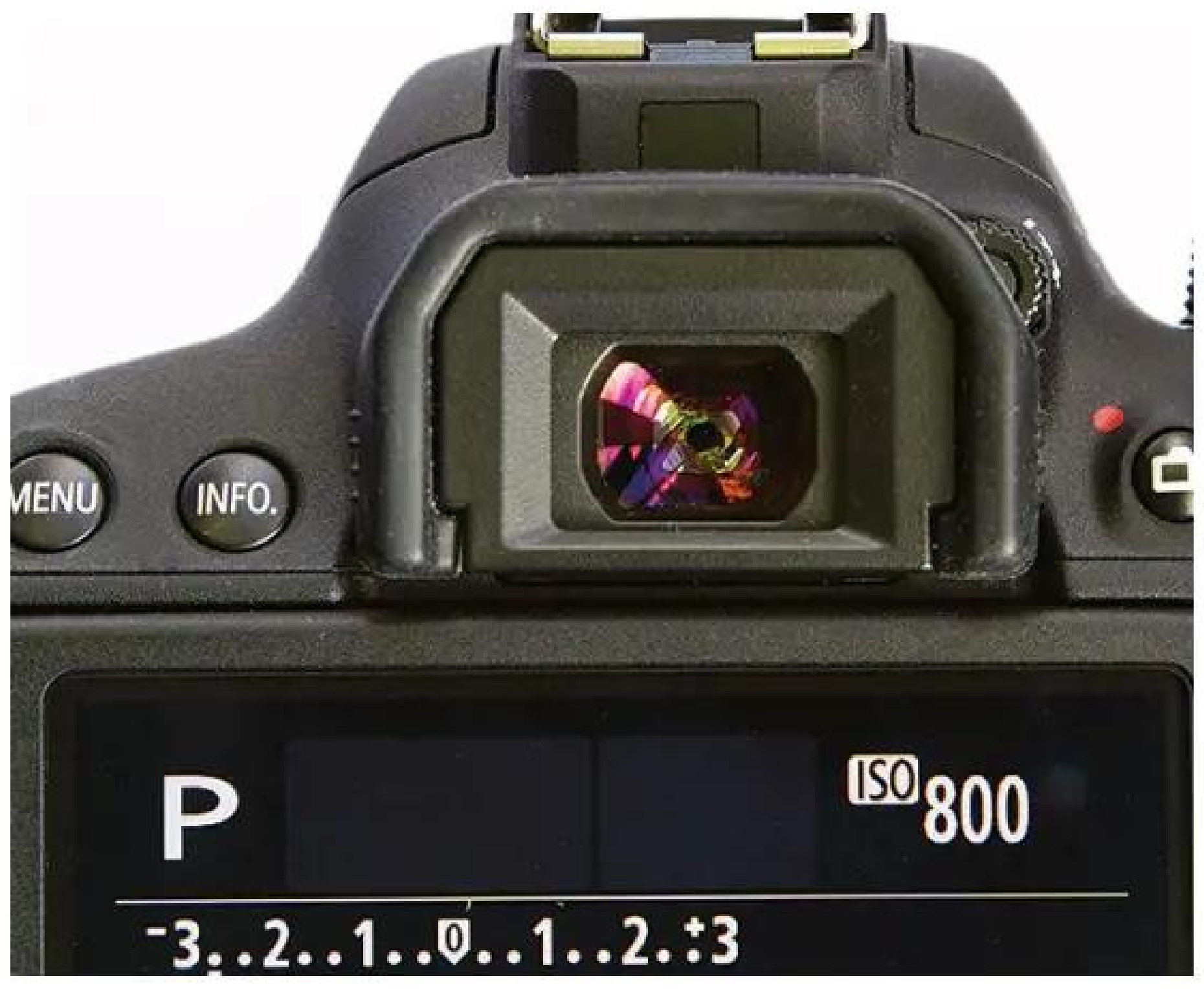
When you want to compose a photo there are two ways to do this on your Canon DSLR. First, you can look through the viewfinder, or option two, engage the Live View feature and see the scene on the LCD screen instead. Each method comes in handy in different shooting scenarios.

Most photographers find the optical viewfinder to be much more useful for a couple of reasons. First, in bright light distracting reflections can make the LCD screen hard to view. But more importantly it's easier to keep the camera steady by holding it up to your eye rather than right out in front of you. Turn the page to find out more... ▶



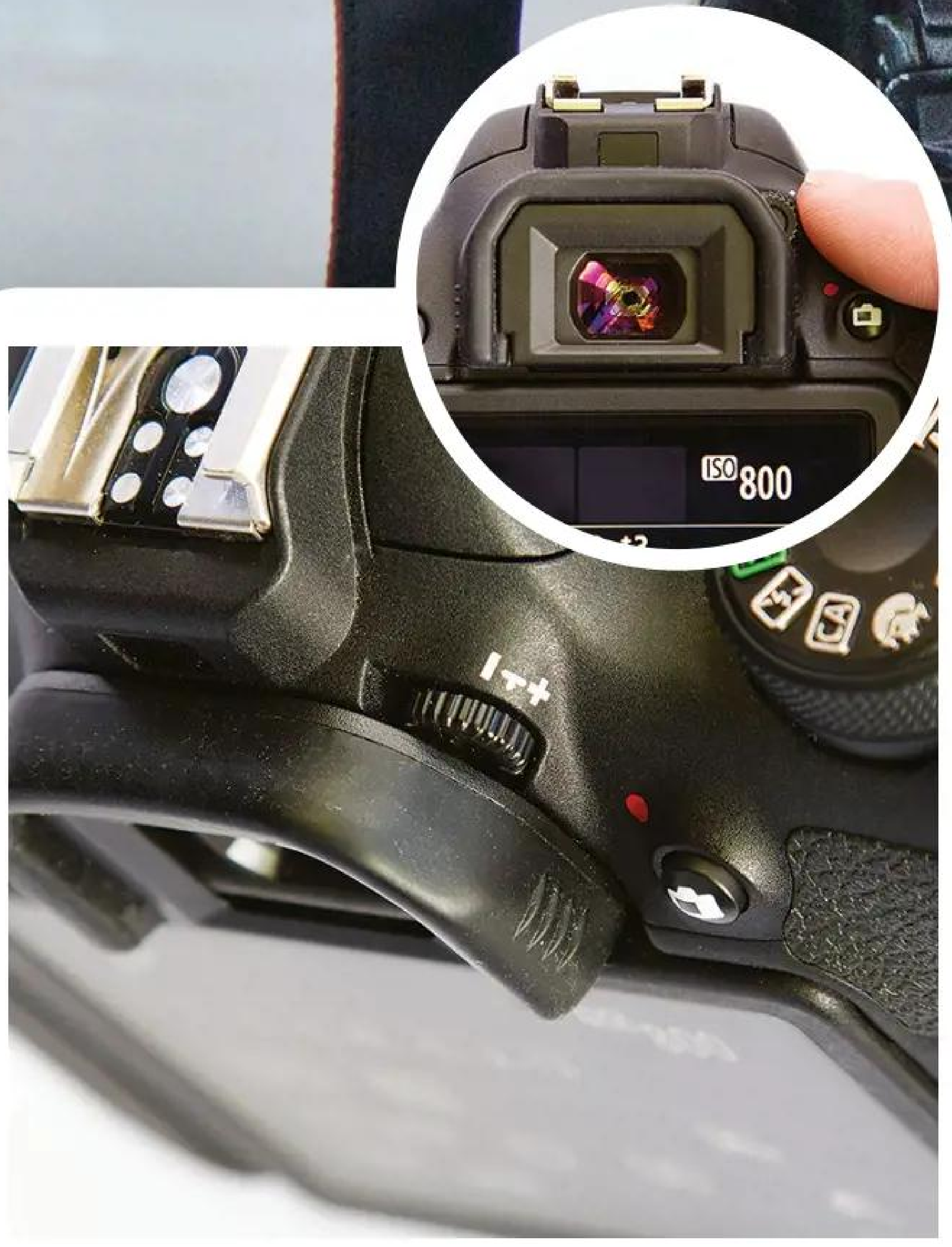
Viewfinder vs Live View

The viewfinder and Live View features perform the same task, so which one should you use?



The viewfinder

The viewfinder enables you to see the scene in front of the lens. To use it, bring it up to one eye and close the other. This masks out distracting elements, enabling you to frame up your shot. The viewfinder also includes information regarding your camera settings. Turn over the page to find out what everything is.

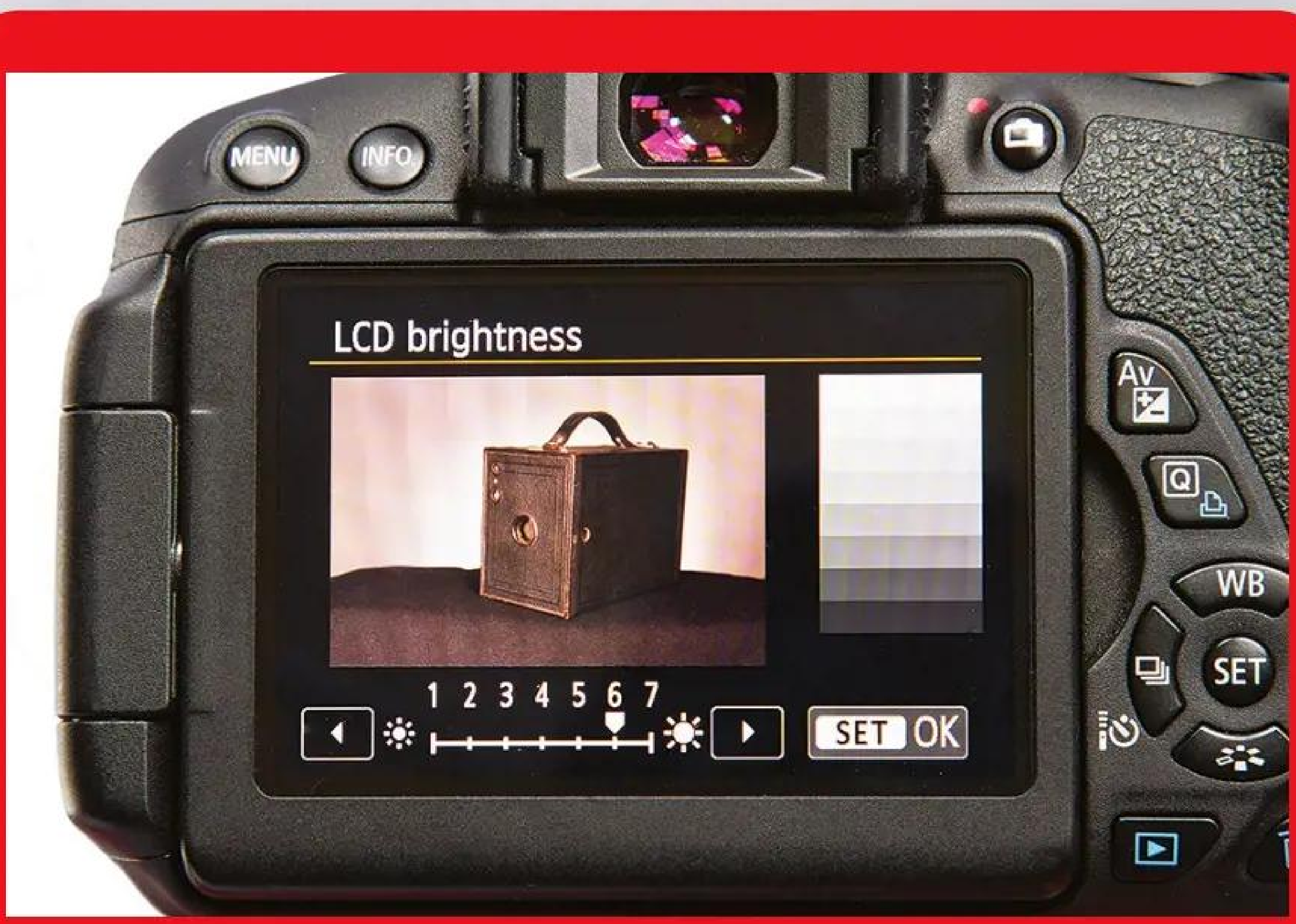


The dioptre

To check your viewfinder screen is in focus you can adjust the dioptre. This will come in handy for those who wear glasses. The dioptre is a small plus and minus dial that you adjust manually. At this stage we're not worried about taking a photo, but simply seeing if the screen inside the finder is in focus. To make sure it's pin sharp check the text at the bottom of the finder image. If it looks blurred, adjust it to your vision.

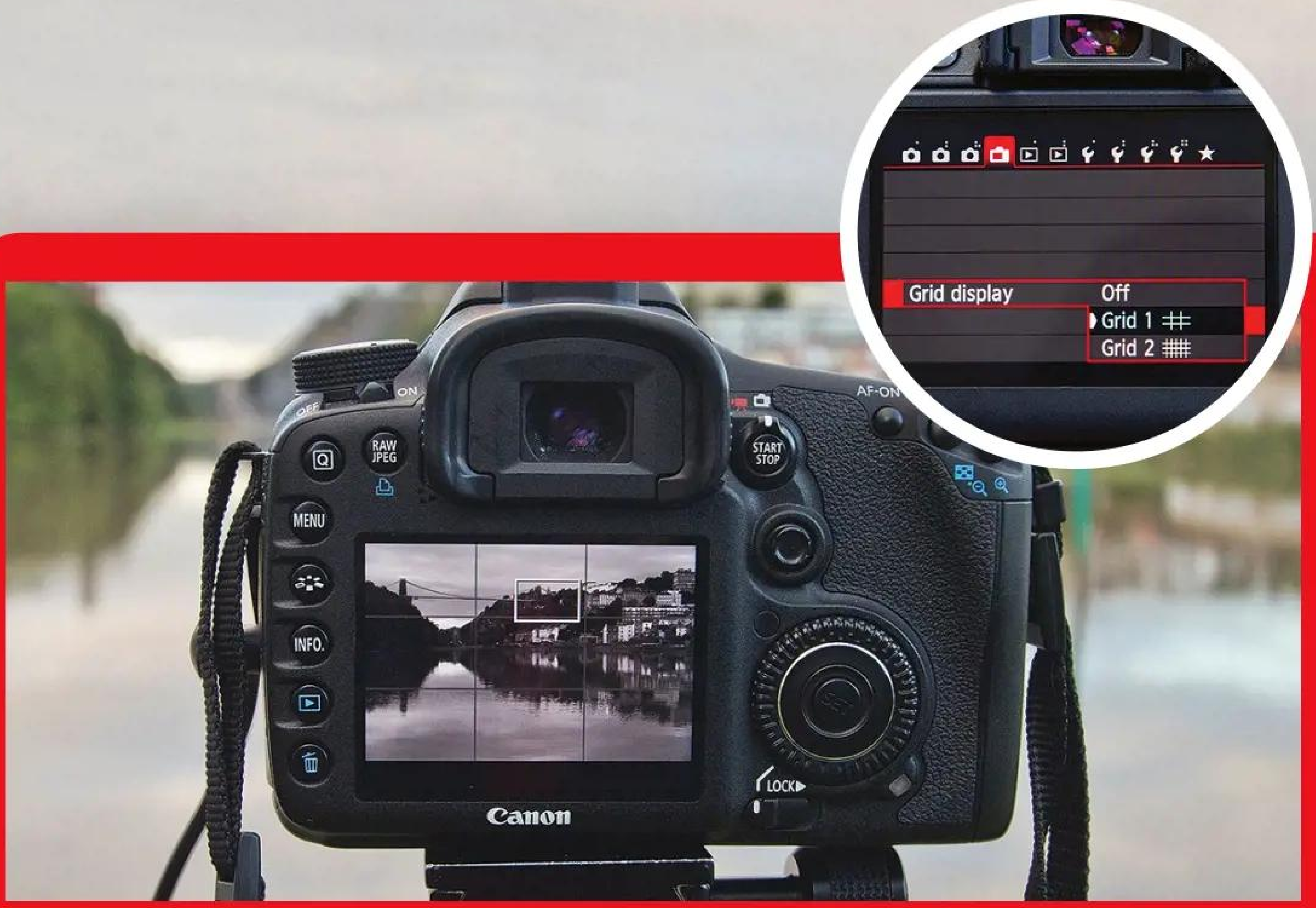
The LCD screen

To engage Live View, press the Live View button on the back of the camera. There's a variety of subjects you can shoot using this option such as still lifes or in low light. It works best when you have your camera mounted on a tripod. Avoid using it when shooting with your camera in your hands.


MENU
INFO
LCD brightness
1 2 3 4 5 6 7
SET OK
Av
WB
SET

LCD brightness

If you're finding it hard to see the LCD screen, adjust the brightness. Head into the main menu and find LCD Brightness. Then use the back-panel multi-controller to adjust the brightness up or down the scale. The brighter it is, the more battery life it will use up.


Grid display
Off
Grid 1
Grid 2
MENU
INFO.
RAW JPEG
START STOP
LOCK
Canon

Live View set up

When Live View is engaged, you can alter the screen display setup by pressing the Disp or Info button on the back panel of the camera. Most DSLRs have the option to include an overlay grid in this feature. This really comes in handy when you're composing your shot. The biggest disadvantage to using Live View is that it will drain the battery of your camera quickly, so keep this in mind. ▶

Through the viewfinder

Let's take a look through the viewfinder to see what's what…

01 THE IMAGE

Through the finder you can see the scene. The mirror in front of the sensor enables this to happen. When Live View is engaged, the mirror is flipped out of the way, making the viewfinder temporarily unusable.

02 SYMBOLS

The symbols on the left-hand side of the screen vary depending on what feature or button is engaged. For example, if you pop the flash then a lightning symbol will appear. In this example the star button on the back of the camera is being held down.

03 CAMERA SETTINGS

In the middle of the screen, starting on the left is the shutter speed setting followed by the aperture. We then have the exposure compensation scale in the middle. When the needle is right in the centre of the scale, the camera considers the image to be well-exposed. To the right of this, the ISO sensitivity setting is displayed.

04 GREEN LIGHT

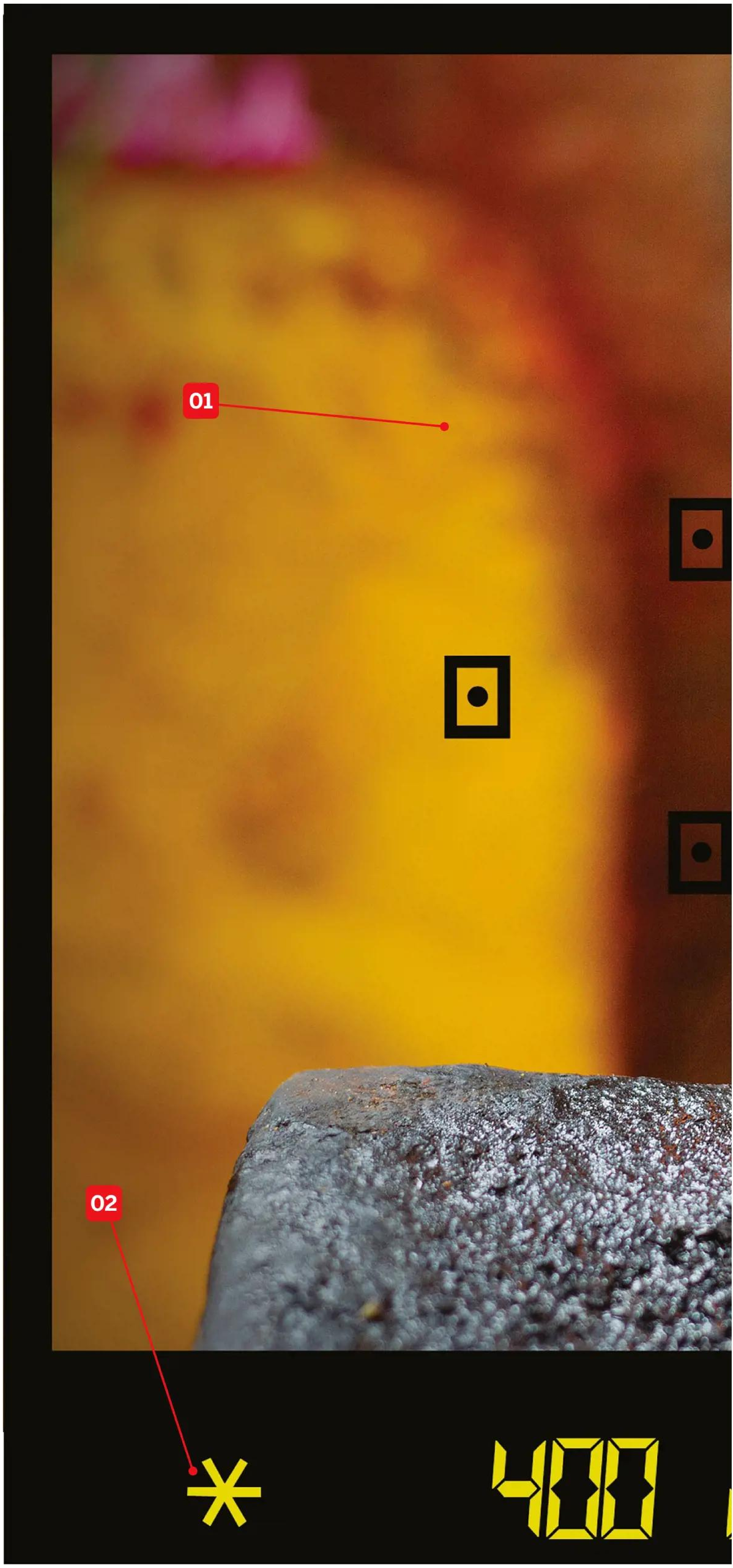
On the right-hand side of the screen a green light flashes on and off. This indicates whether the focus is locked. When the light is engaged, the focus is locked and ready to shoot.

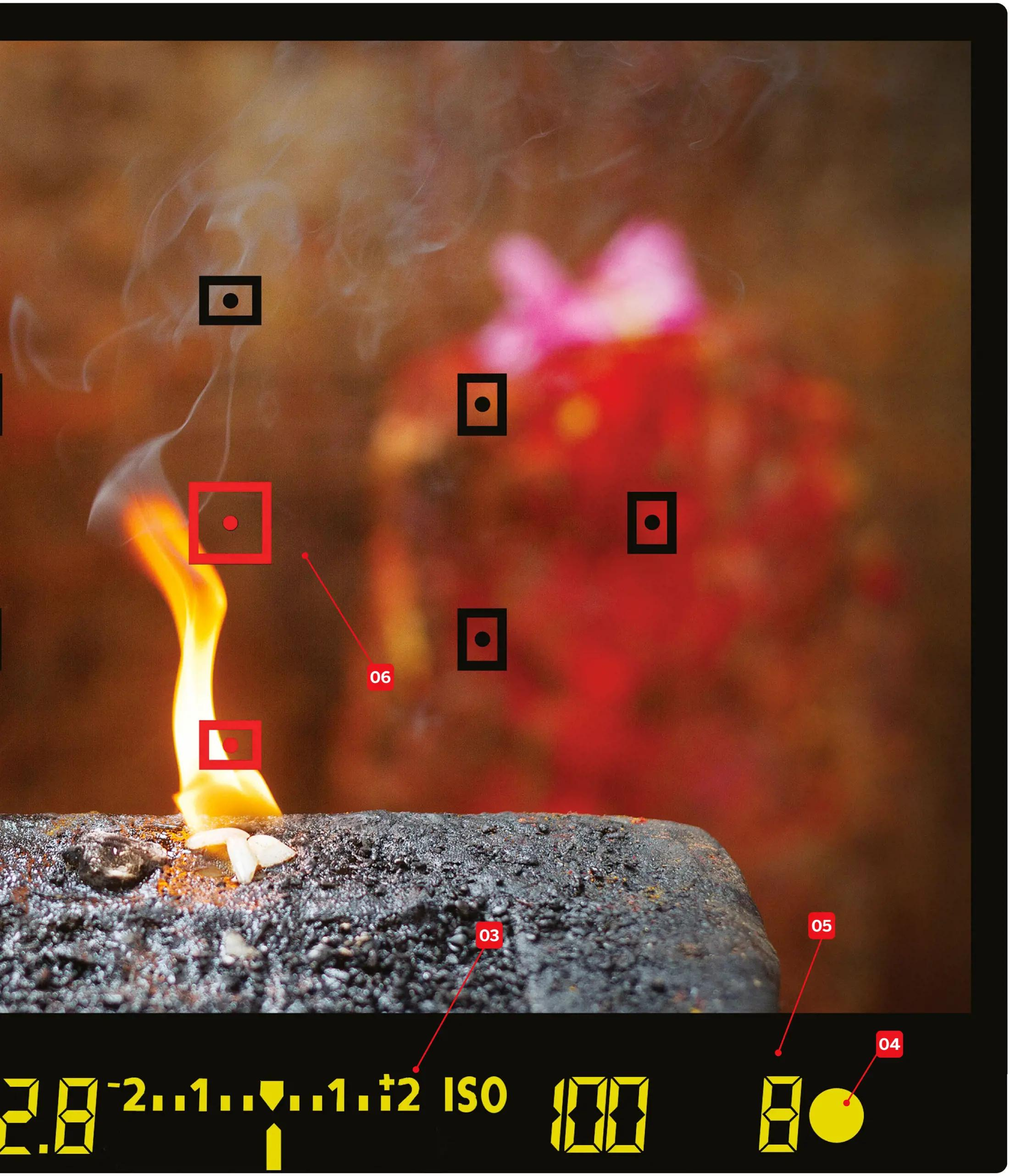
05 NUMBER OF SHOTS

The number next to the focus indicator light indicates the total number of shots the camera can fire in a sequence. This will vary depending on how you have your camera set up.

06 FOCUS POINTS

Your camera's focusing system is made up of a grid of focus points. The point or points of the image that are in focus light up red.




06
03
05
04
2.8
-2..1..▼..1..+2 ISO
100
8 ●

Adjust the settings

Navigate and alter camera settings quickly using the Quick Control screen on the back-panel LCD

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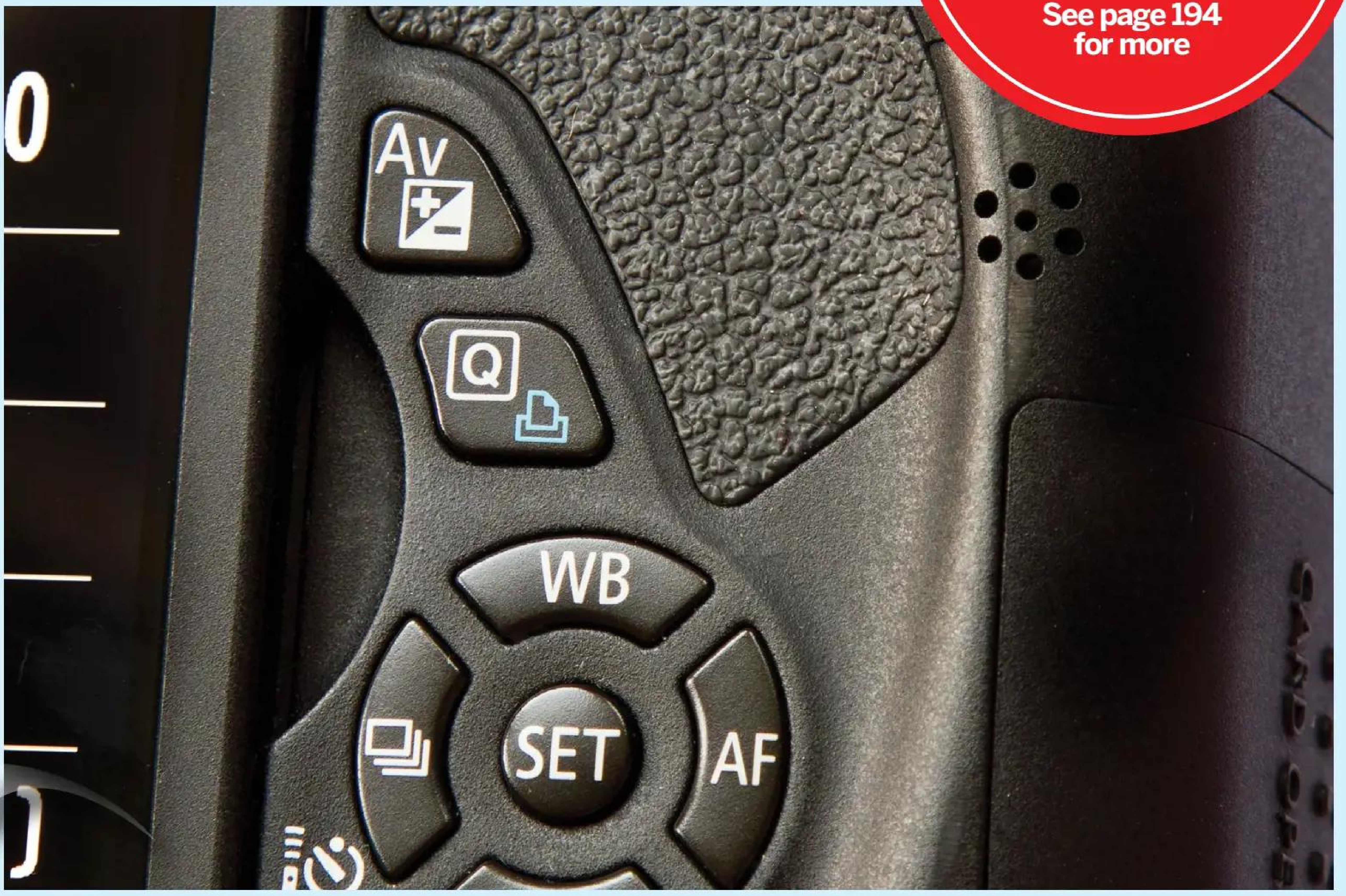
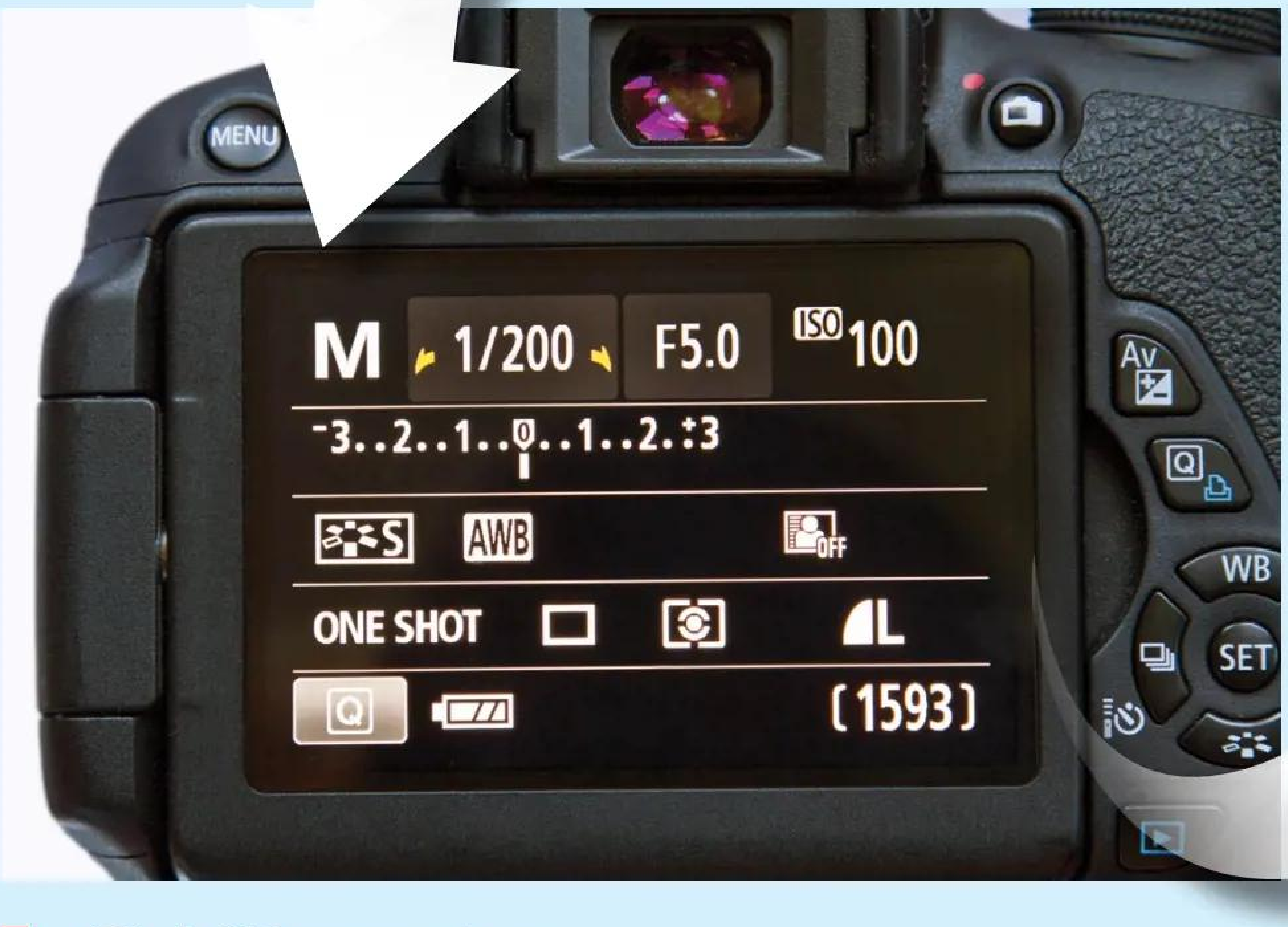
See page 194 for more

1 Q button

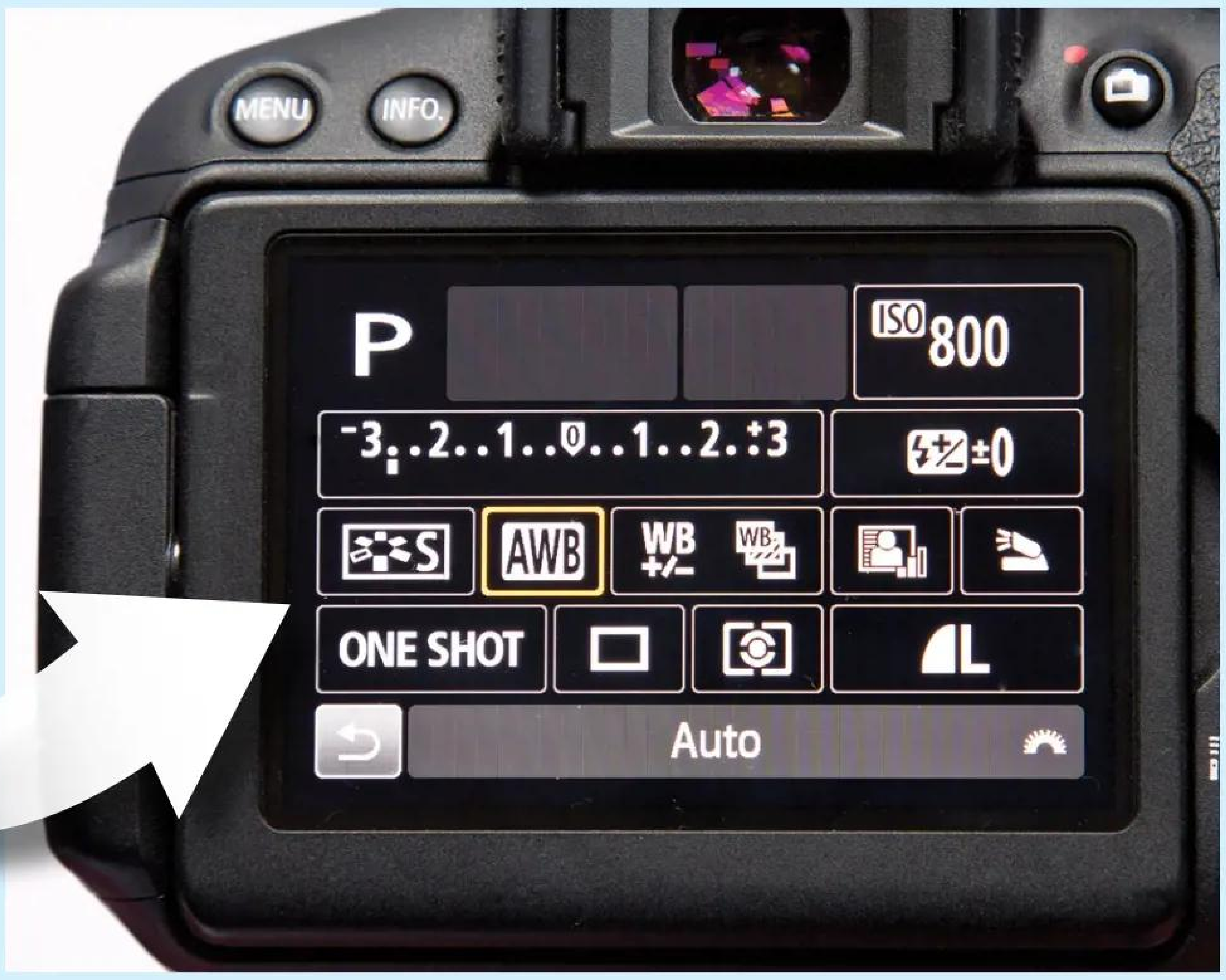
If you need to be quick off the mark then Canon has a great feature to help you. It's called the Q button, which stands for Quick control. Even though you can see information through the viewfinder, the rear LCD screen gives a much more comprehensive range of information and settings. The Q menu enables you to access all of these settings and make speedy adjustments.





2 LCD overview

Before we see the Q button in action let's take a quick glance at the LCD screen. In the top left-hand corner you'll see the selected shooting mode. Next along is the shutter speed setting followed by the aperture. If you're in the program mode, you may not see one or both of these settings. In the right-hand corner is the ISO setting. Below we have the exposure meter, followed by two rows of camera settings. These include the autofocus mode, white balance, and image quality settings.



3 The Q button in action

To quickly access a feature press Q and a box on the screen becomes highlighted. You can then move around the back screen using the back-panel multi-controller to navigate up, down, left and right. As you become more familiar with your camera you'll get to know what all these settings do and where to find them.

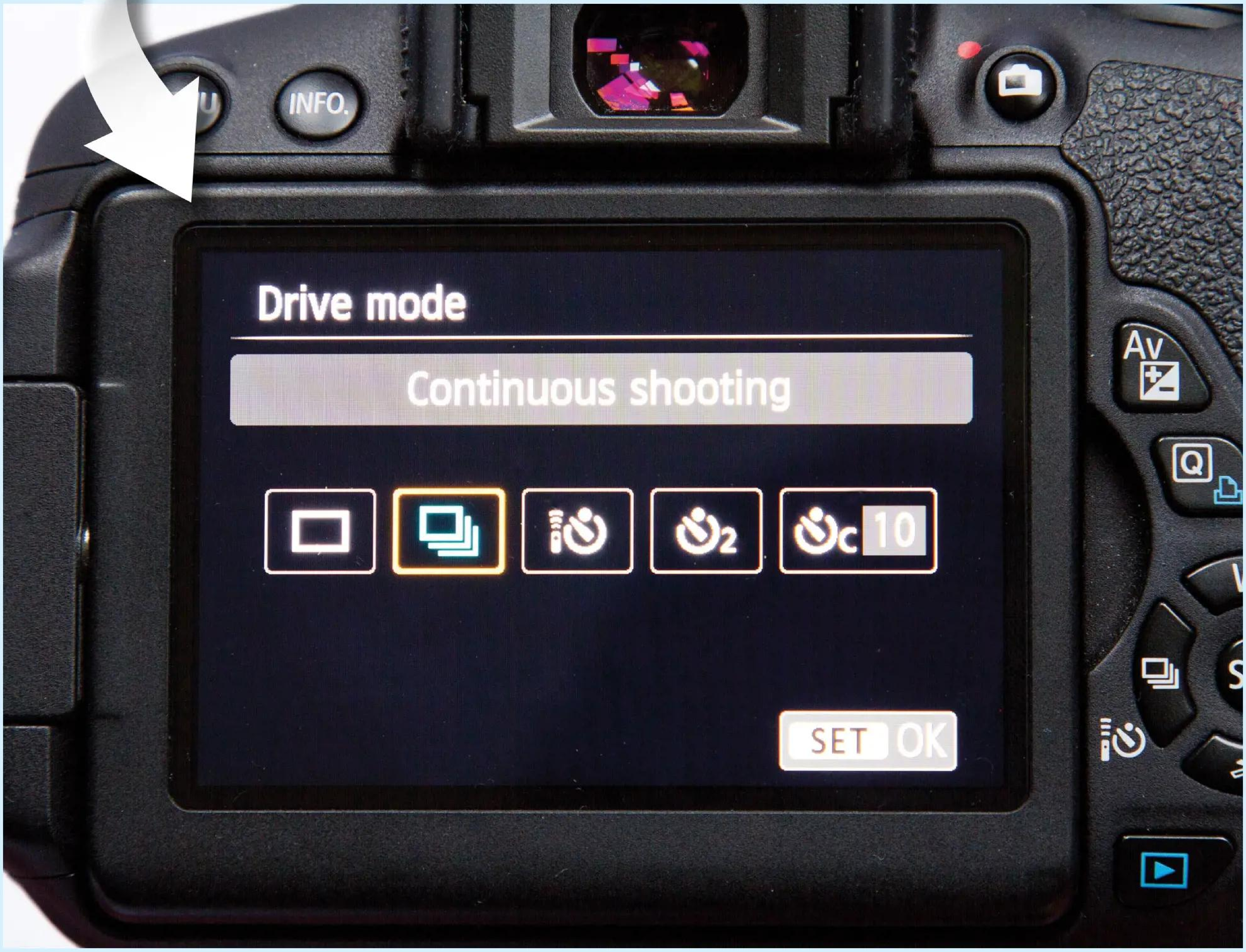
IMAGE STABILIZER
ISO
M
SCN
Av
Tv
P
ON

4 Change a setting

Let's take a closer look at altering a setting. Once you're in the desired setting, press the Set button to alter. This takes you to an external menu. You can then use the multi-controller to navigate through to your chosen setting and press Set again to select. Or to be really quick, on the LCD screen highlight a feature by pressing the Q button, and use the command dial to flick through to your desired setting.

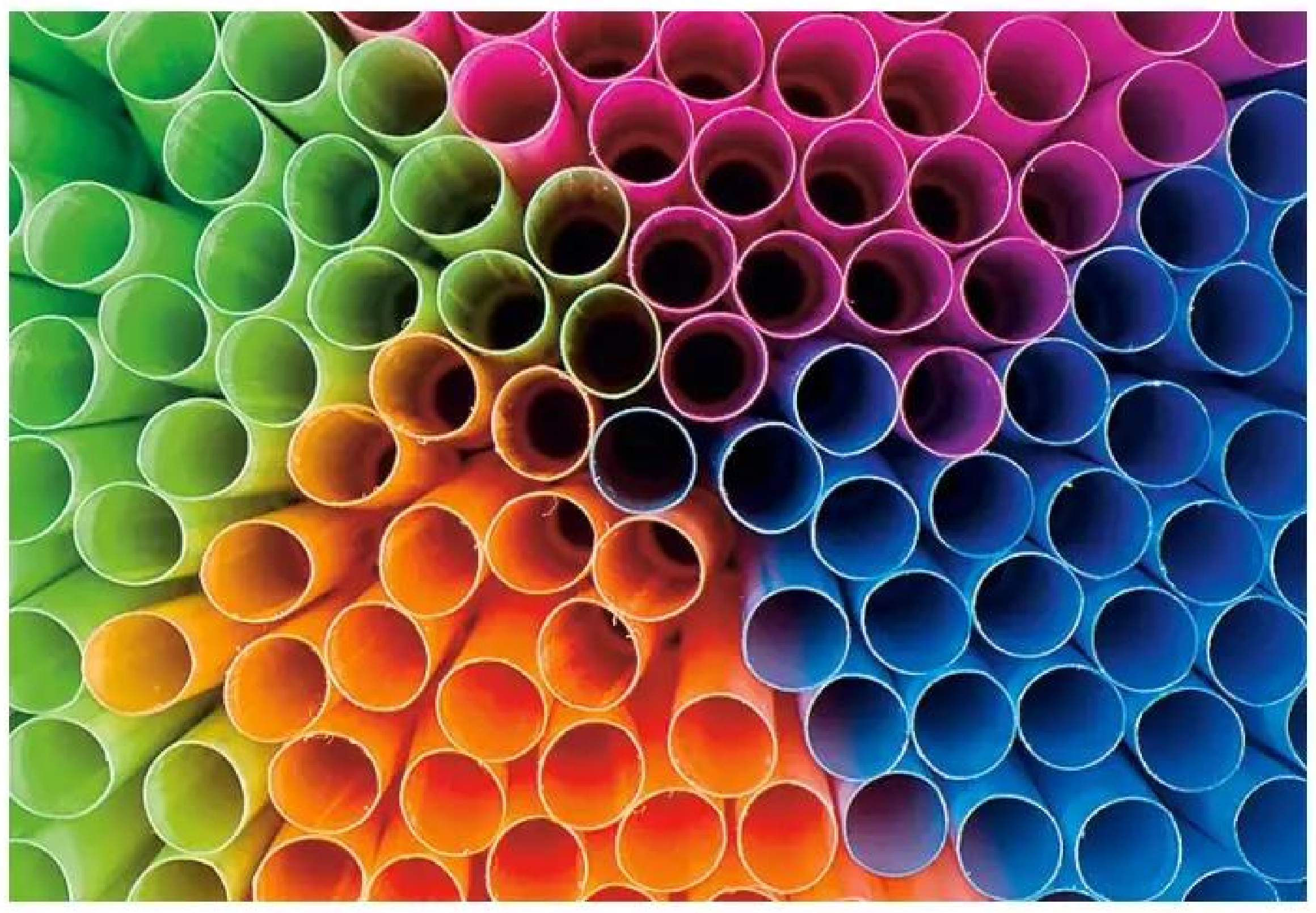
5 When Q is handy

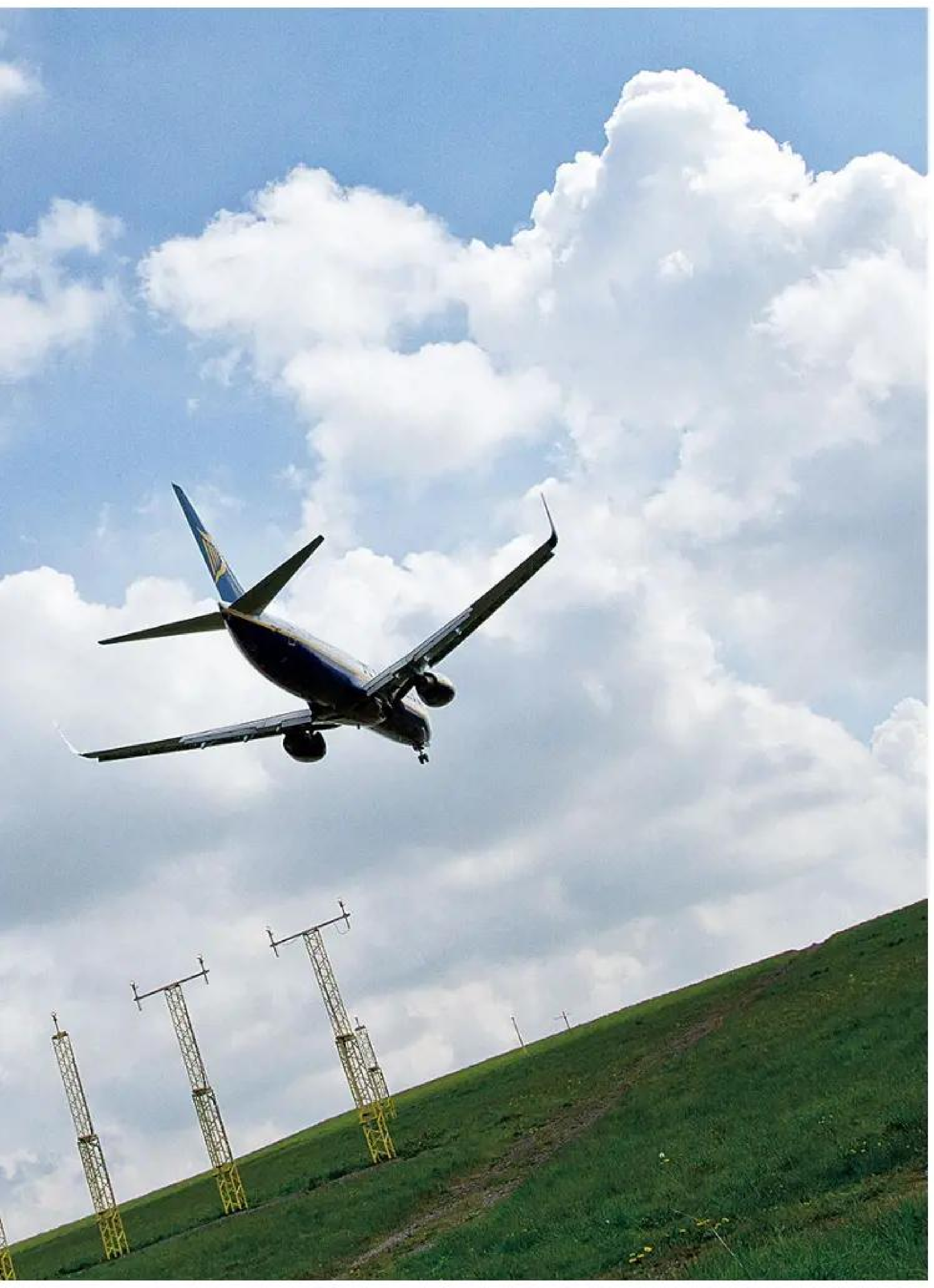
There are many occasions when the Q button will come to the rescue. For example, if you're shooting action and you want to change the drive mode, you can do so at the bottom of the LCD screen under the box symbol icon. An external menu to this camera setting looks like this. To go back to the main screen, press the Menu button.



ISO
M
Av
Tv
P
SCN
ON
OFF

MENU
INFO
Tv
1/200
ISO AUTO
-3..2..1..0..1..2.:3
AWB
ONE SHOT
L
[1235]
Q
Av
WB
SET





Exposure modes explained

Discover how to choose the appropriate exposure mode for a given scene on your Canon digital SLR camera

34 Fully automatic and scene modes
Let your Canon digital SLR take control of all the settings for you with the automatic and scene modes

40 Program mode explained
Take more control over your exposures using the semi-automatic program mode

44 Shutter priority mode
Control the look of photos featuring moving subjects using your DSLR's shutter speed

48 Aperture priority mode
Control the amount of depth of field in your images using the aperture setting on your camera

52 Manual mode explained
Take complete creative control of your DSLR and learn how to balance exposures using the manual exposure mode

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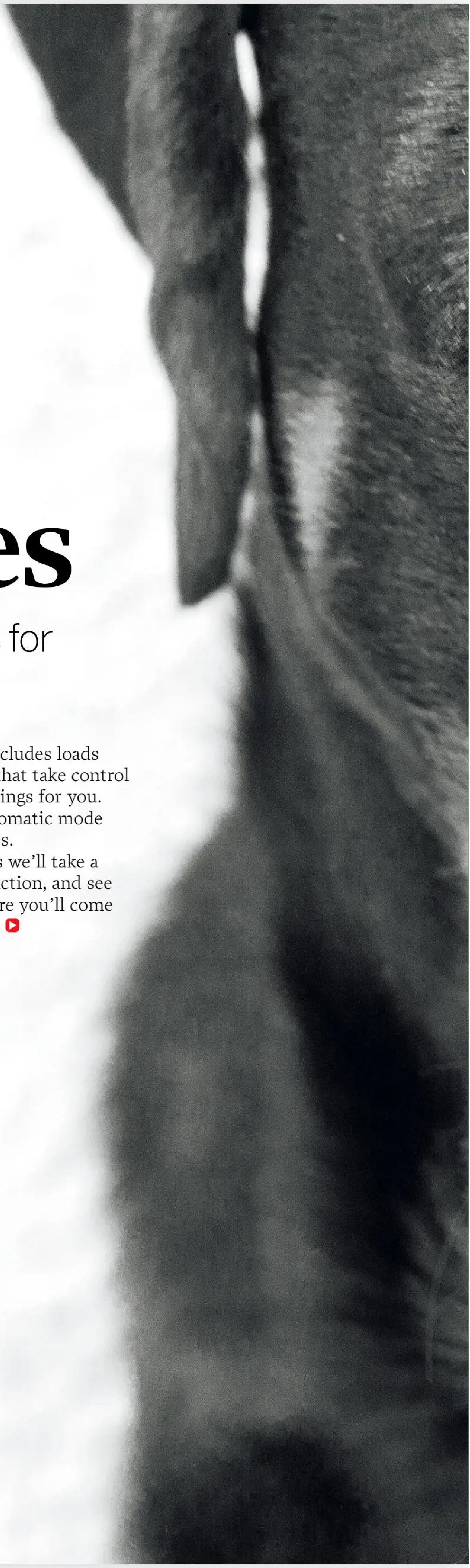
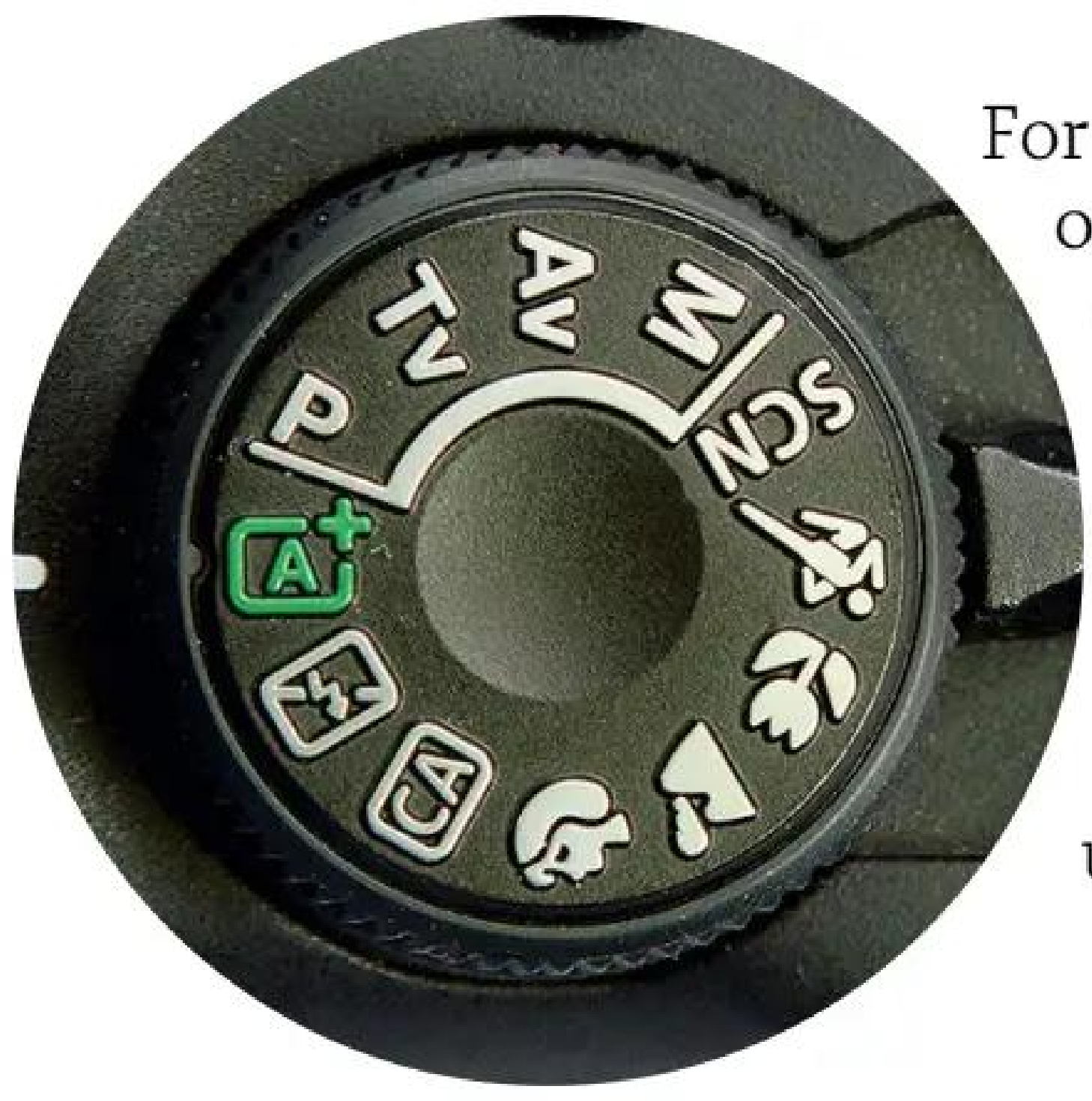


Fully automatic and scene modes

Let your Canon DSLR take control of all the settings for you with the automatic and scene modes

When you first start using a DSLR, it can be a little overwhelming. Not only do you need to consider what subject matter you're shooting, you also may feel bombarded by the number of technical camera settings available and not understand what each one does.



For this exact reason, Canon includes loads of beginner-friendly modes that take control of the technical camera settings for you. This includes the fully automatic mode and a range of scene modes.

Over the next six pages we'll take a closer look at them all in action, and see just what they do, and where you'll come up against their limitations.

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See page 194 for more

Automatic modes explained

Your mode dial is full of auto shooting options. Here are the main four...

M
Av
Tv
P
SCN
CA

Fully automatic mode

This is marked on the mode dial by a green rectangle. Fully automatic selects all your camera settings for you. This sounds great, but you'll come up against limitations. Your camera may not always be accurate, and in low light, the flash will always engage regardless of whether you want it to. Plus, you as the photographer have no creative input to the final result. It's best to use the fully automatic mode until you get comfortable using your camera, and then progress to the creative modes.

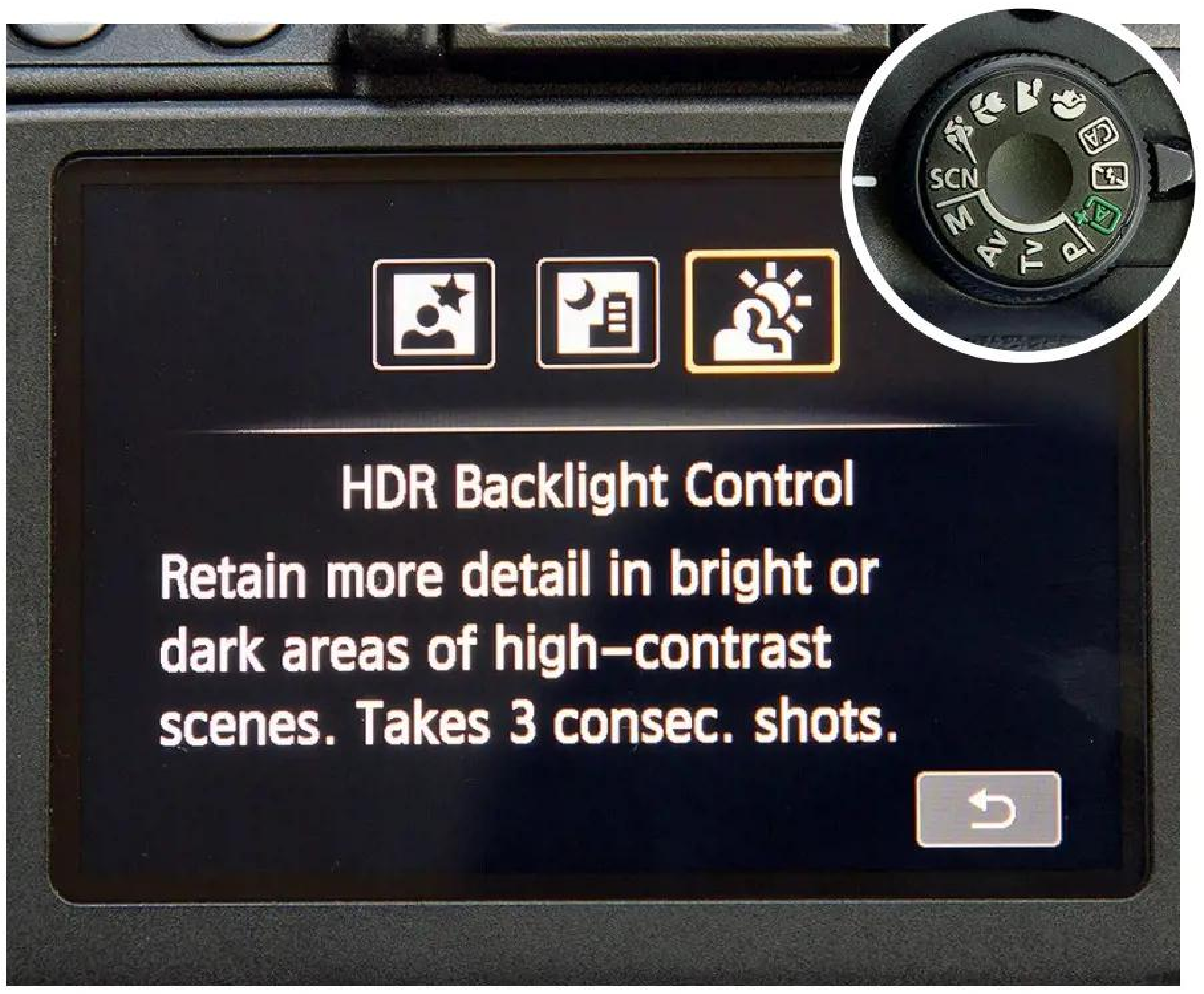
Creative auto mode

The creative auto mode has been designed so that the user can alter certain camera settings without having to get too technical. Marked on the mode dial as CA, this setting is one of the most flexible and creative of all the exposure modes available. For example, if you want to alter your image to black and white, or create a blurred background around your subject matter, then you can. Press Q and use the back-panel multi-controller to adjust the settings.

P
Tv
Av
M
SCN
CA

No flash mode

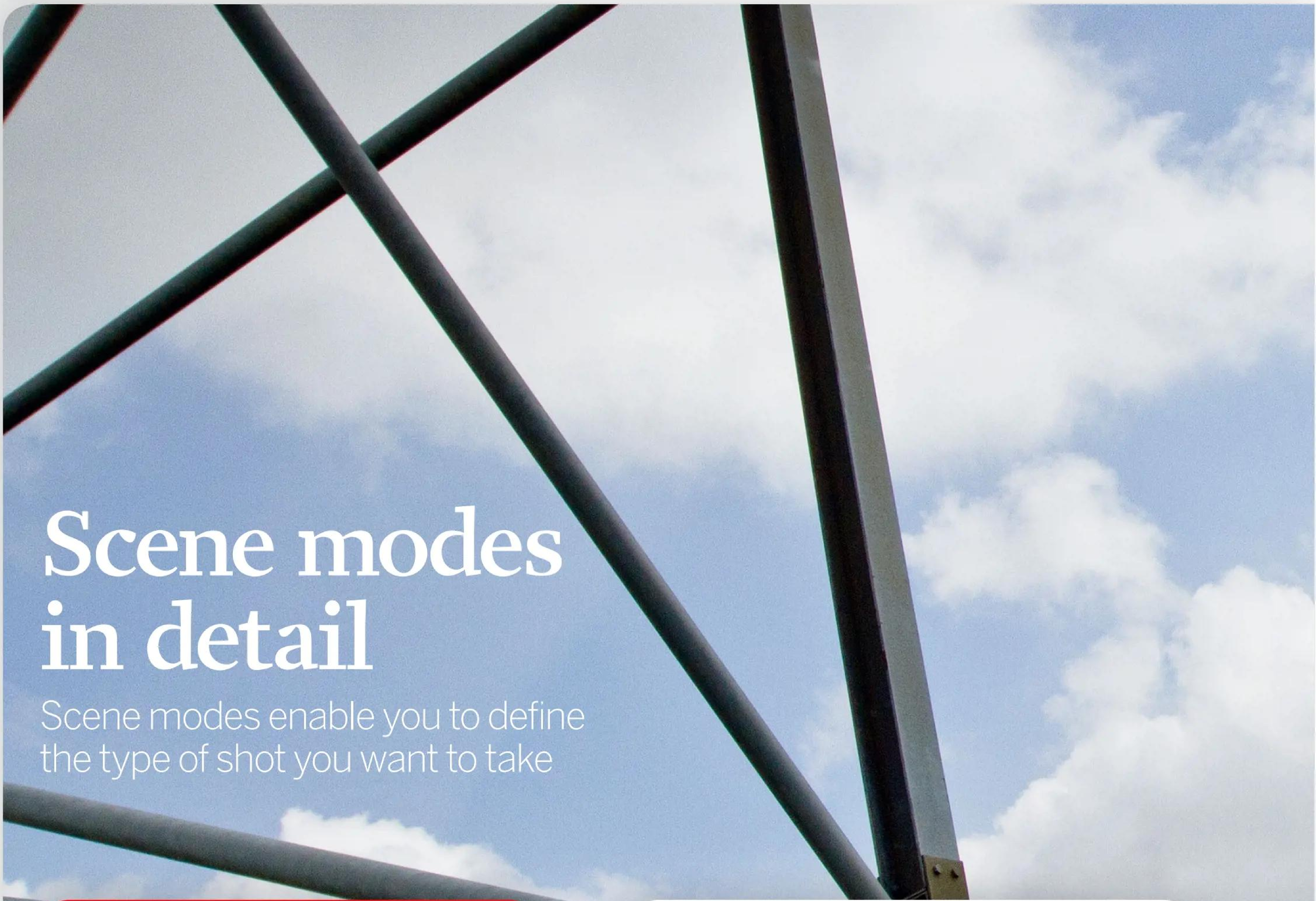
If you need to be discrete then the no flash mode can be useful. Marked on the mode dial by a lightning symbol with a cross through it, this mode will automatically control all your camera settings for you, but won't engage the pop-up flash in low light. This can be handy in a museum or art gallery where flash photography isn't allowed.


HDR Backlight Control

Retain more detail in bright or dark areas of high-contrast scenes. Takes 3 consec. shots.

SCN mode

Some of the Canon DSLRs available also include the special scene mode option. With this you can access more specialised modes. On this model (the 700D) the options includes HDR, night portrait and handheld night scene. ▶



Scene modes in detail

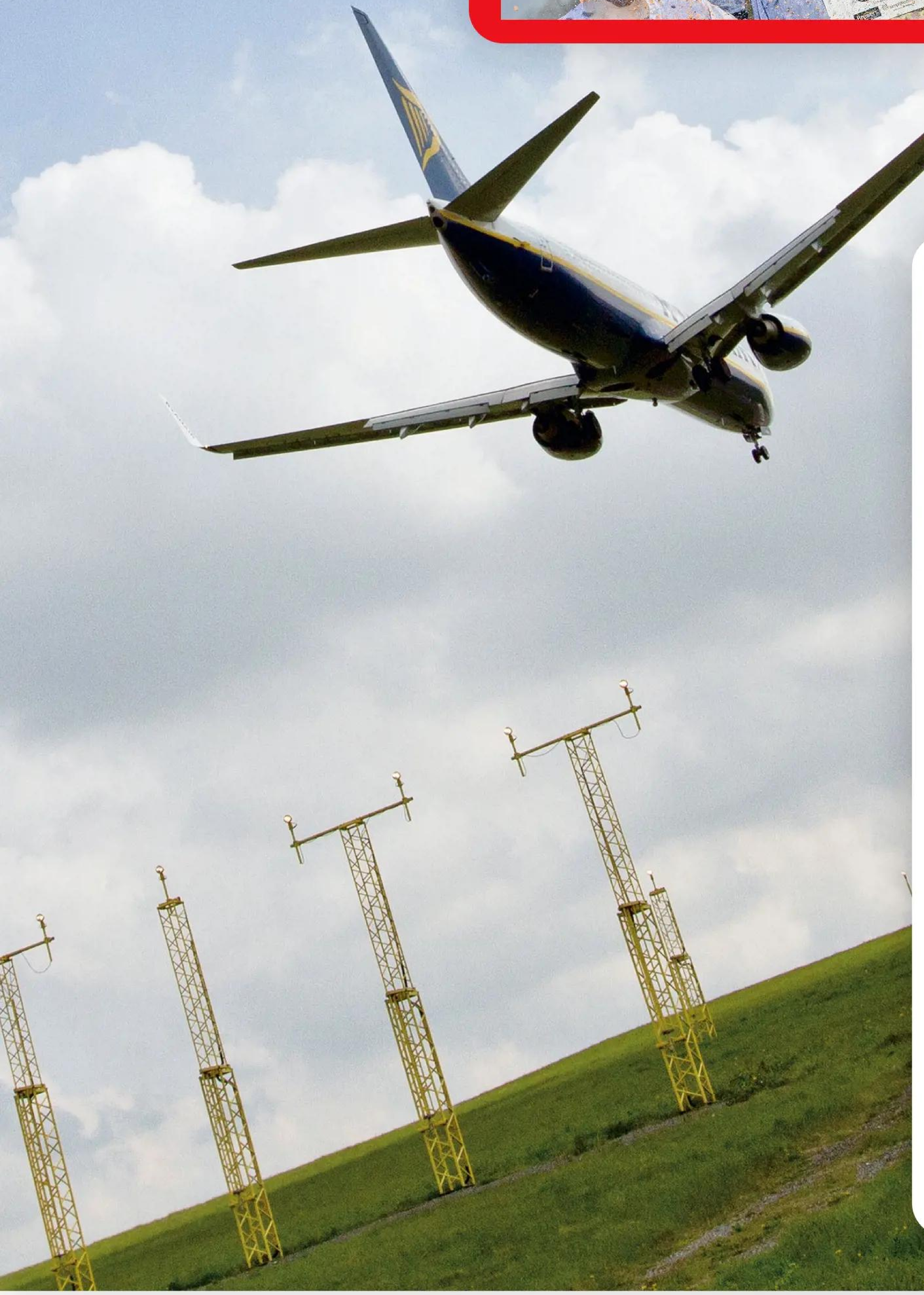
Scene modes enable you to define the type of shot you want to take

Close-up mode

When shooting subject matter at close range, switch to the close-up mode. There are many subjects that work well for this type of photography. They include flowers, small fruit (like in the image above), and abstracts of household objects.

Portrait mode

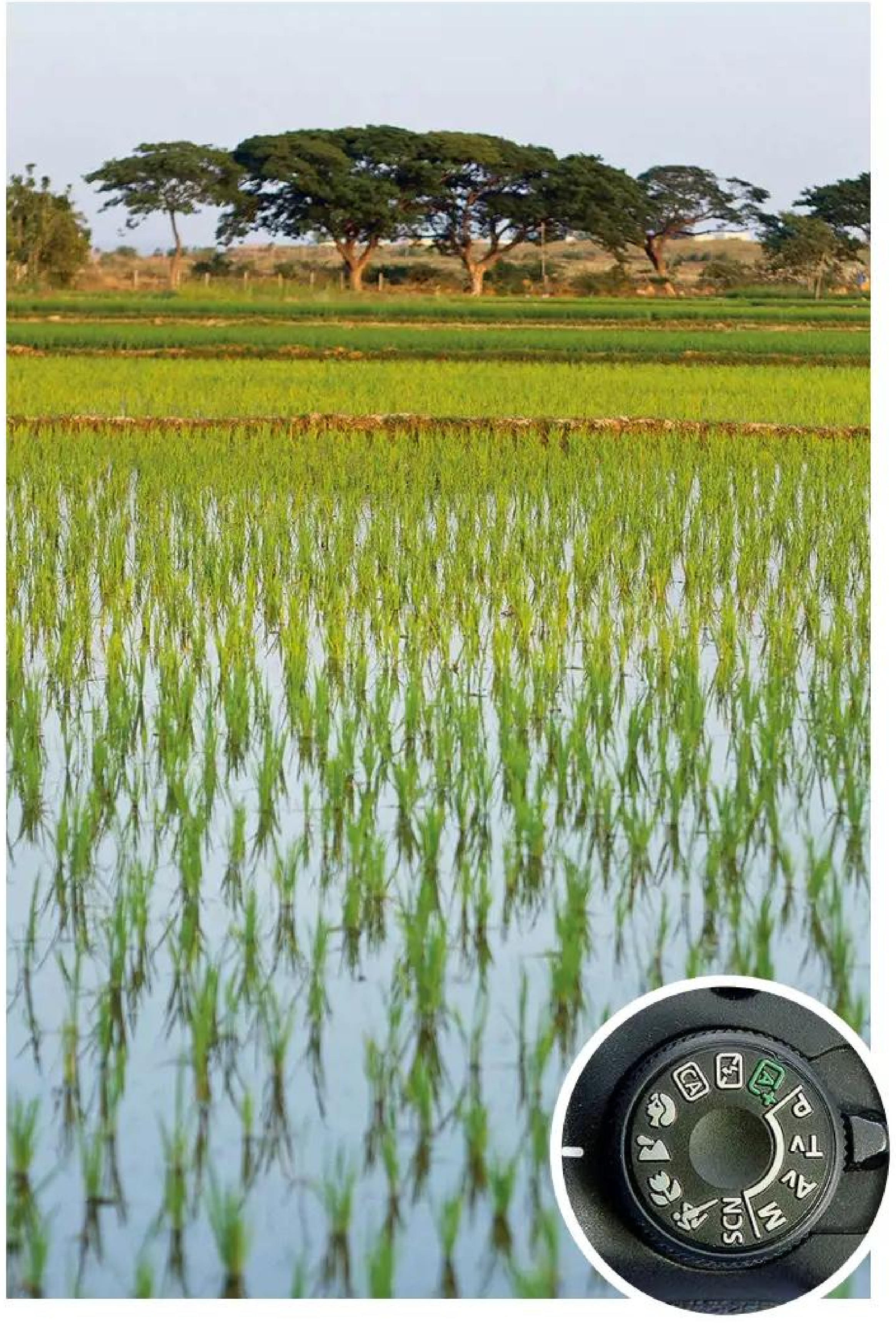
When you want to take a portrait, put your camera into the portrait mode. With this setting, your camera will blur out the background and adjust the tones in the image to smooth the skin and enhance the hair. Like with all the scene modes, you can fine-tune the mode options. To do this, press the Q button and use the back-panel multi-controller to navigate the settings. Press the Set button to select.



51
SCN
M
Av
Tv
P

Sports mode

If you want to capture the moment, the sports mode option is the best. This is useful for photographing kids on the go or any type of energetic subject matter. In this mode your DSLR will change the focus setting to track your subject matter, giving you a better chance of keeping the image sharp.



Landscape mode

If you find yourself in an impressive landscape, switch your mode dial to the mountain icon. Under the default setting option (press Q and Set to engage) you can adjust the effect of the final result based on the light conditions you’re shooting in, for example, at sunset. The landscape mode will aim to keep both the foreground and the background of the scene in sharp focus. It will also boost the colours in the scene for extra impact.

Program mode

Take more control over your exposures using the semi-automatic program mode

To improve your photography you need to start taking control of your DSLR, but don't worry – it's not half as daunting as it first sounds. To enter the program mode, simply turn the mode dial around to P. In program mode your camera automatically controls the shutter speed and aperture settings. But it also has a few other tricks it can perform. Turn the page to find out more...

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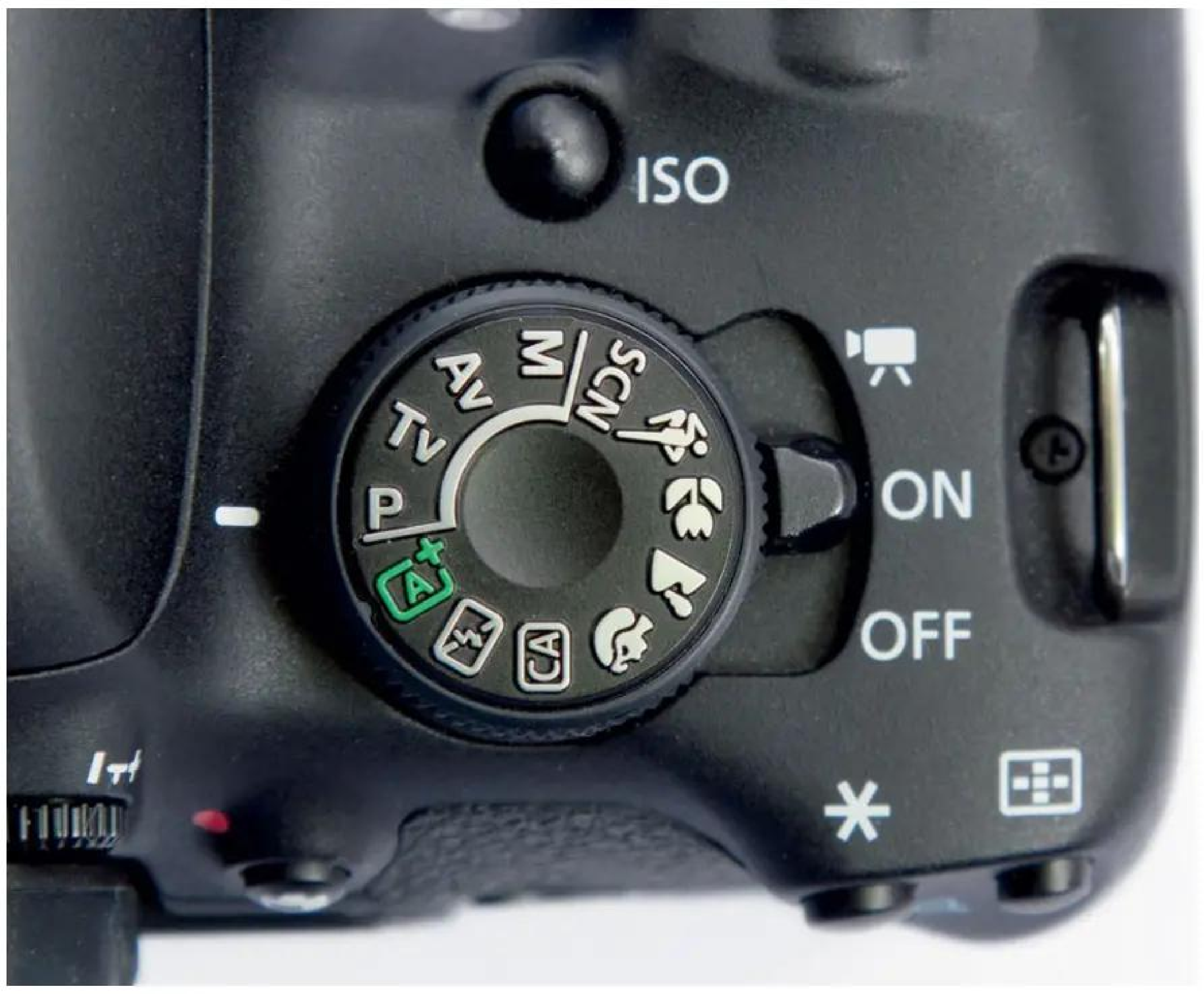
easyJet.com
G-EZBO
easyJet

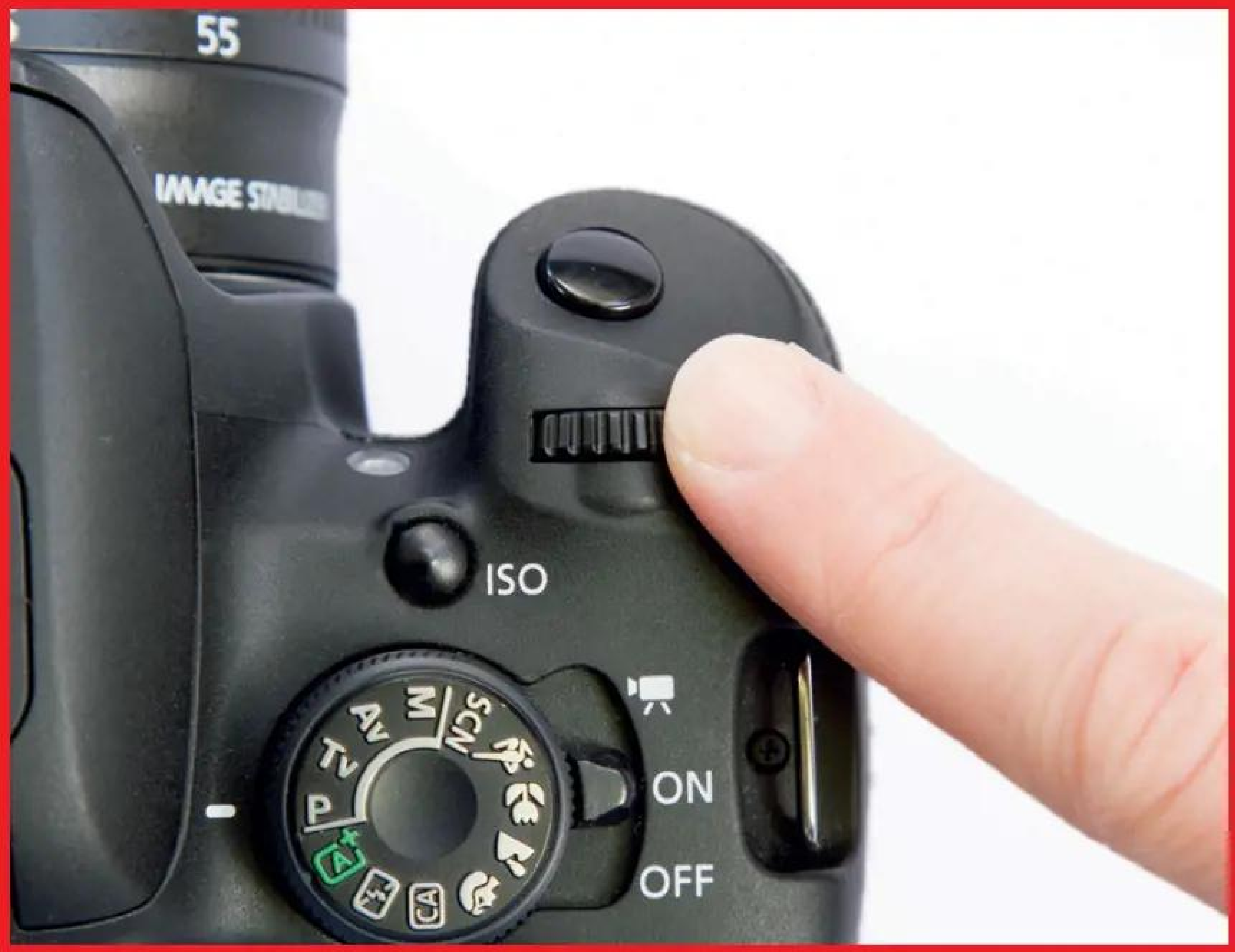
Program mode explained

All you need to know when shooting in your Canon's program mode


ISO
M
Av
Tv
P
SCN
CA
ON
OFF

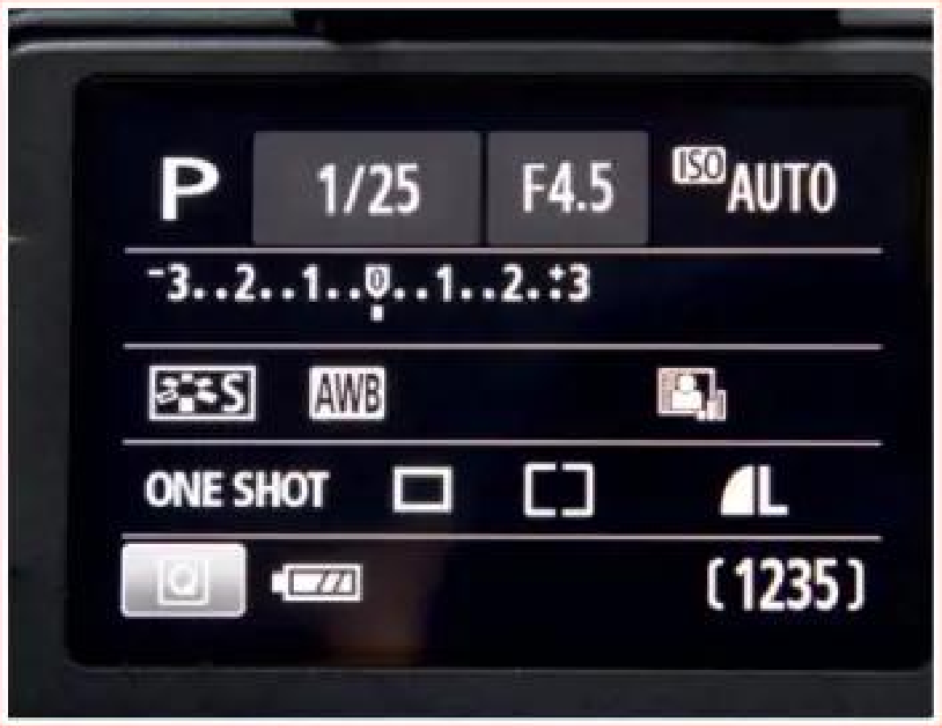
Switch to program mode

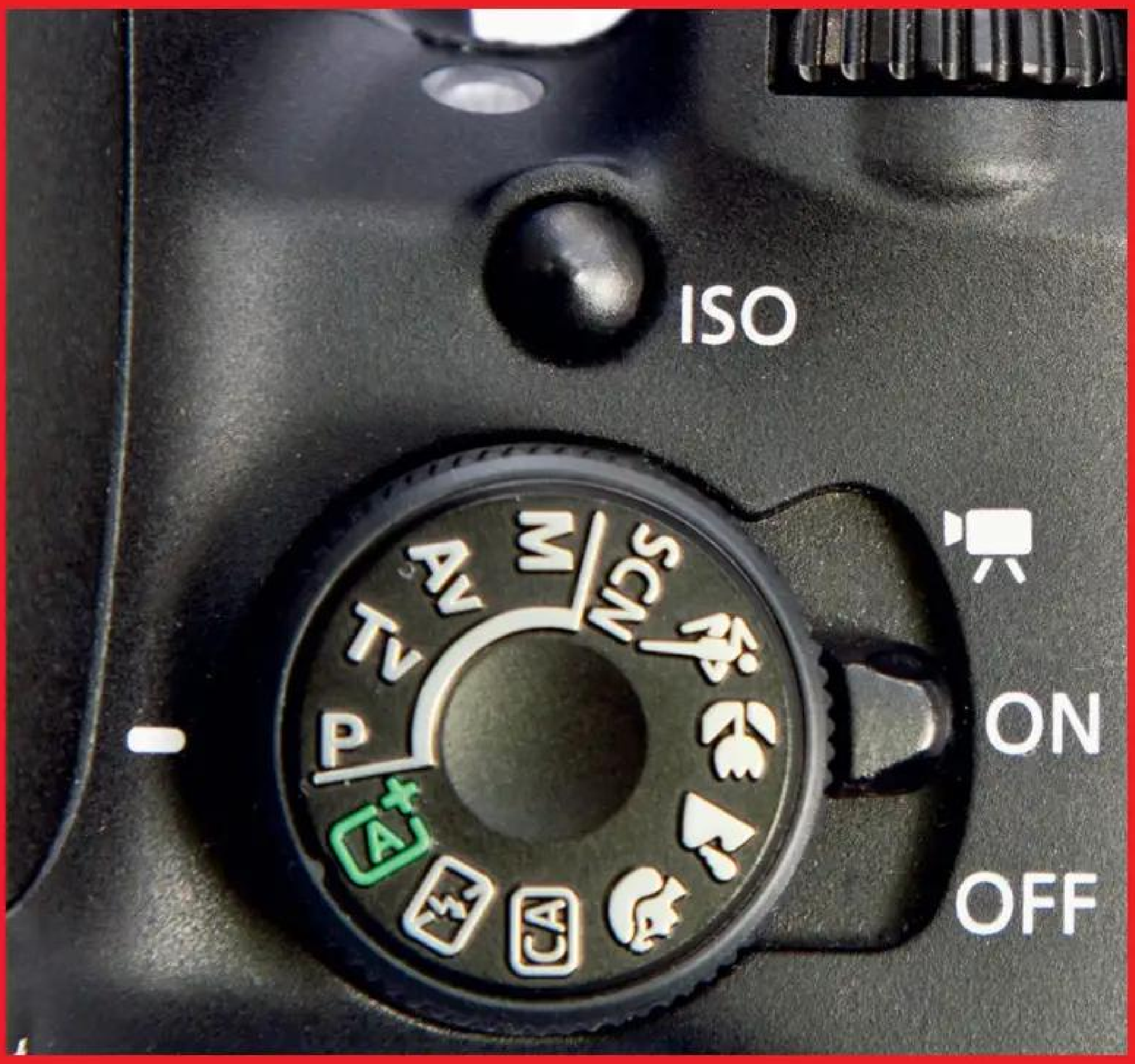
To enter program mode, turn the mode dial around to P and frame up the scene. When you half press the shutter-release button, your camera will set both the shutter speed and the aperture, according to how light or dark the scene is. But unlike the fully automatic mode where you can't alter the camera settings, in program mode you have more options to play with.


55
IMAGE STABI
ISO
M
Av
Tv
P
SCN
CA
ON
OFF

Alter the exposure values

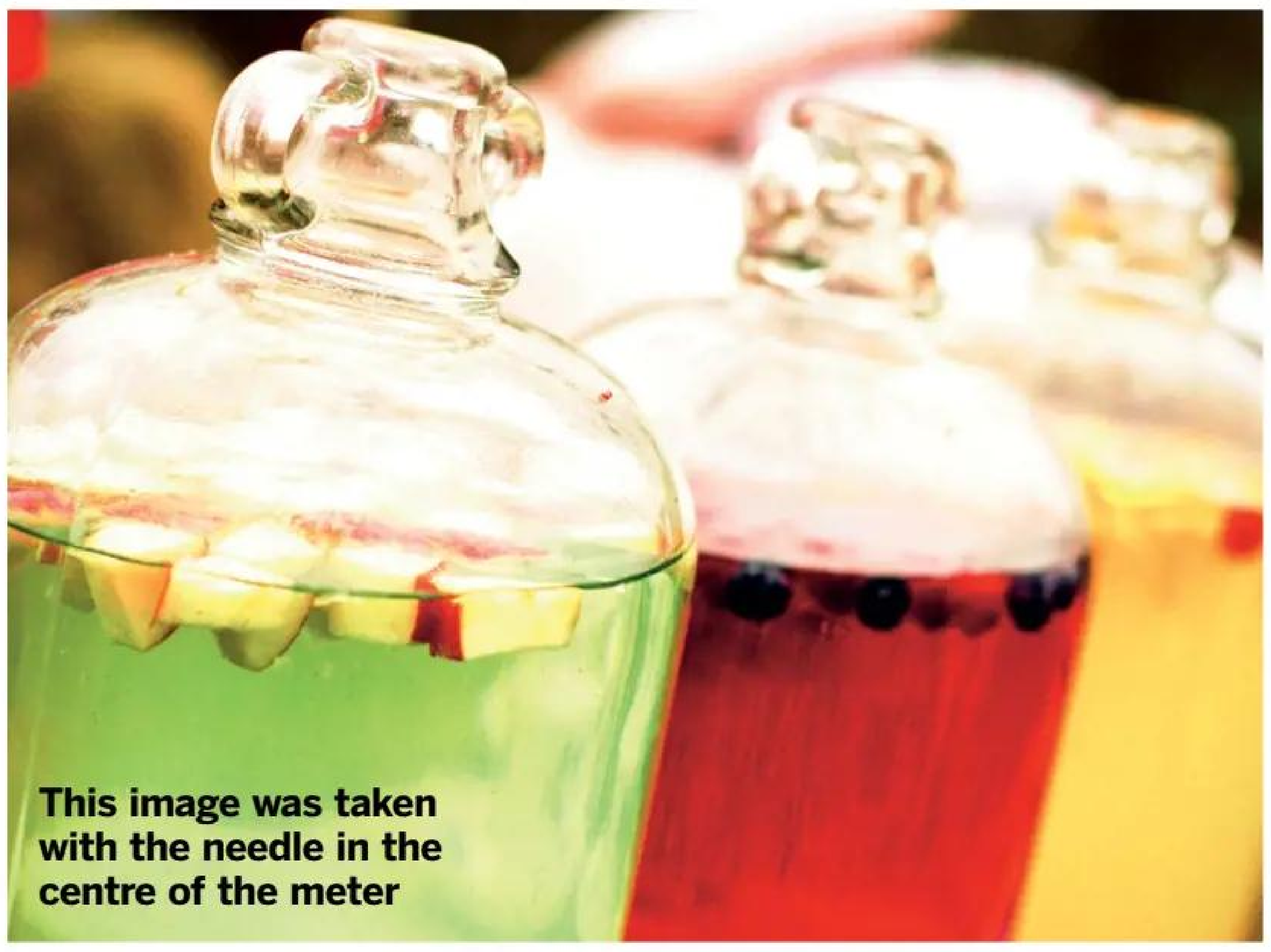
If you're not happy with the settings your camera selected, you can alter the combination of shutter speed and aperture using the command dial. You'll notice it changes both the aperture and shutter speed to match the light conditions.


P
1/25
F4.5
ISO AUTO
-3..2..1..0..1..2.:3
AWB
ONE SHOT
L
[1235]

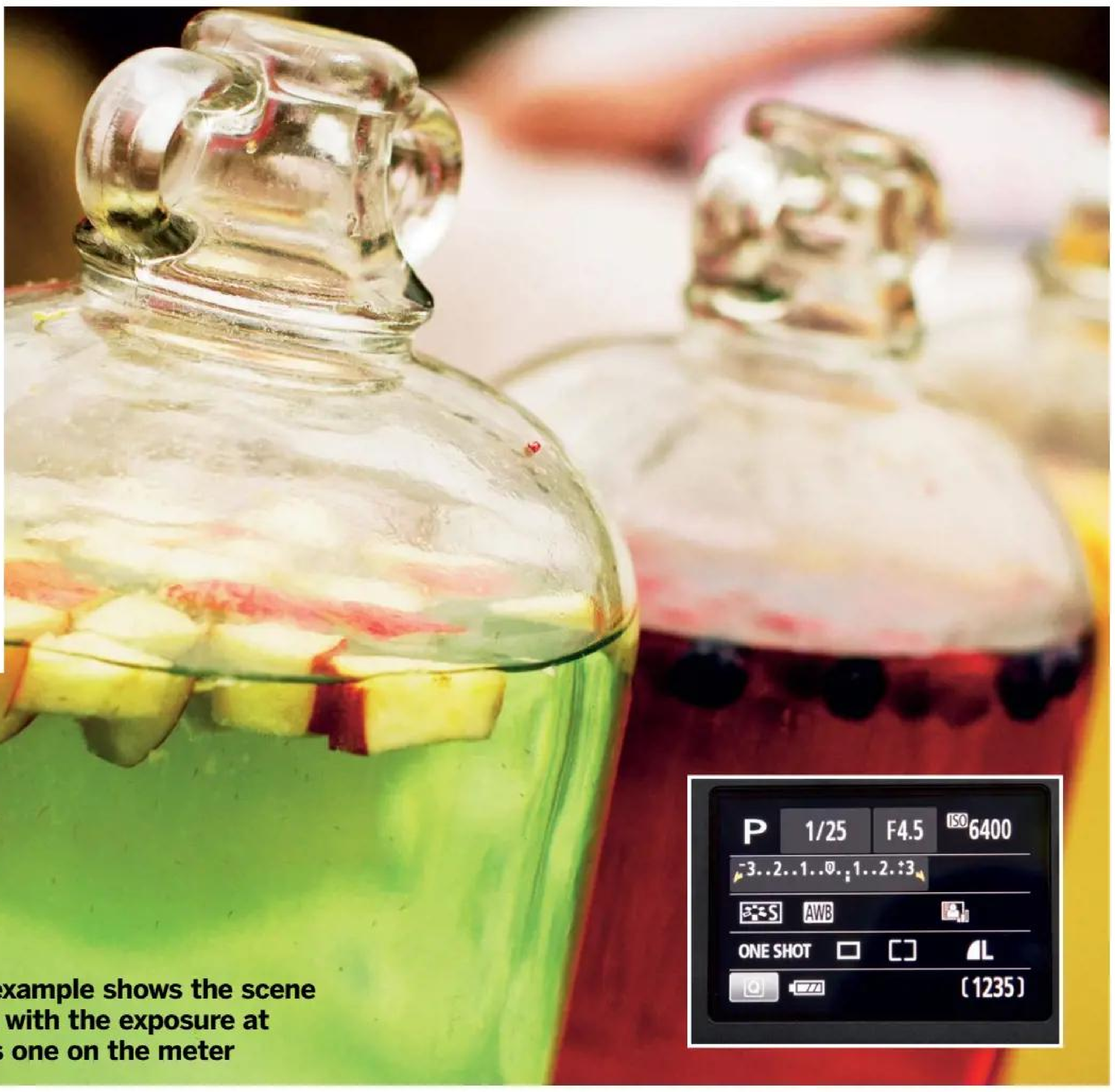


Adjust the ISO

You can also alter the sensitivity of your camera's sensor in program mode. Press the ISO button and then alter it accordingly. When shooting in bright light, you want to keep it on a lower setting such as ISO100. However, if you're shooting in low light then you need to push it up to a higher number such as ISO800. This is extremely useful when shooting handheld to avoid a slow shutter speed blurring the end result.



This image was taken with the needle in the centre of the meter



This example shows the scene taken with the exposure at minus one on the meter

Exposure compensation

Unlike with the fully automatic mode, in program mode you have the option to alter the exposure compensation. This feature enables you to brighten or darken the final result in small increments. To do this on a beginner camera model, hold down the plus/minus button and use the command dial to move the needle up and down the scales. On an advanced model, use the back-panel multi-controller.

Shutter priority mode

Freeze or blur movement in a scene using shutter-priority mode

If you want to shoot a moving subject, the best shooting mode to use is shutter-priority mode, or Tv as it's marked on the mode dial. Tv stands for Time value, and this mode is perfect for when you want to control the shutter speed setting of your camera, but you want your camera to balance the aperture automatically. The shutter speed defines the length of time the sensor will be exposed. It's measured in seconds or fractions of seconds. If it's a long shutter speed, such as one second, it will be written as 1”. If it's a fast shutter speed then it will look like a fraction, such as 1/1000 sec. We'll explain all you need to know over the page... ▶

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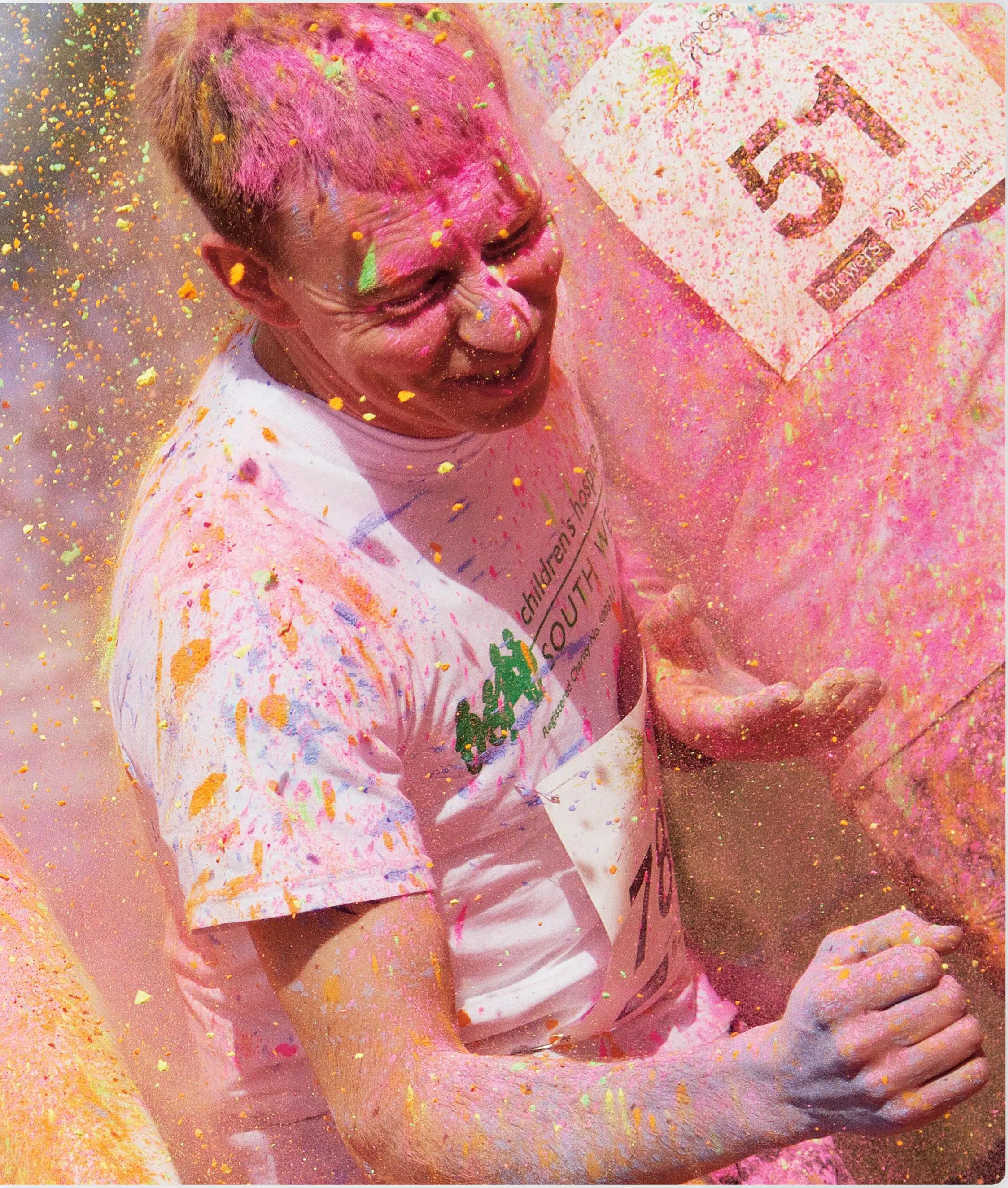
See page 194 for more

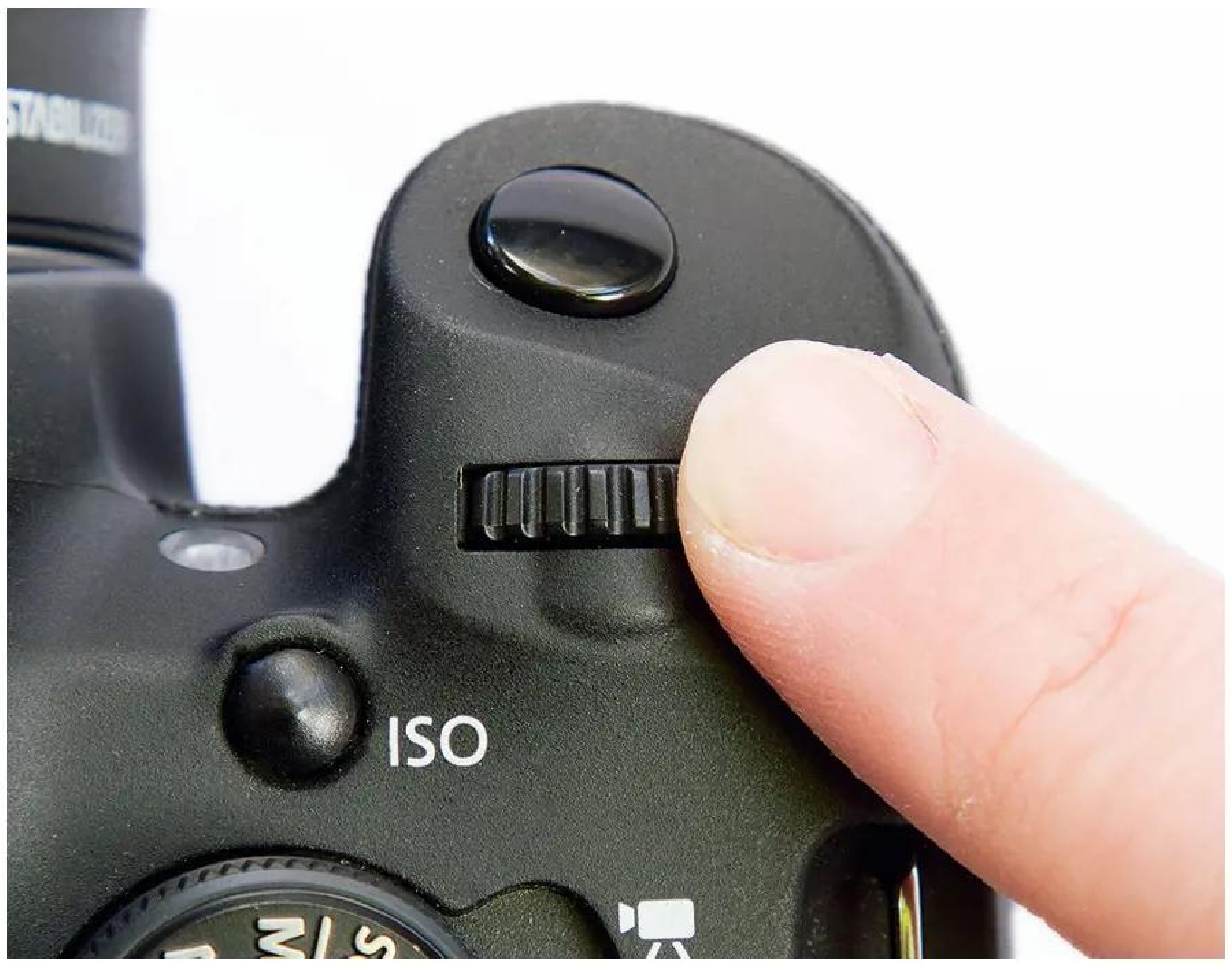


Timing is everything

Control the look of photos featuring moving subjects using your DSLR's shutter speed

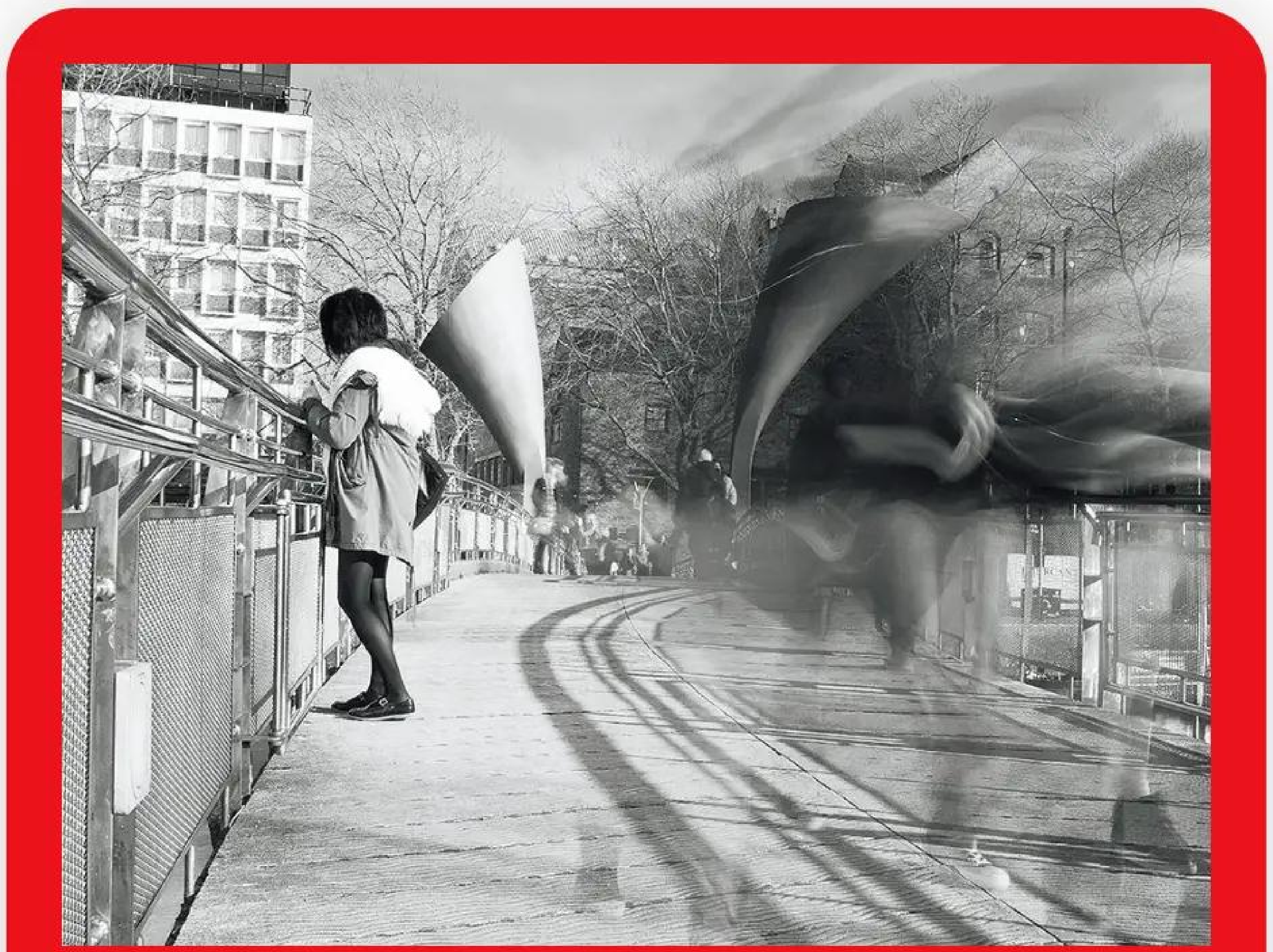
Freeze the moment

If you want to freeze fast-paced action then you need to set your DSLR to a fast shutter speed. On the Canon EOS 700D and many of the beginner models the fastest speed you can pick is 1/4000 sec. This means the shutter will be open for one four thousandth of a second. This is fast enough to freeze anything that's moving in the scene.



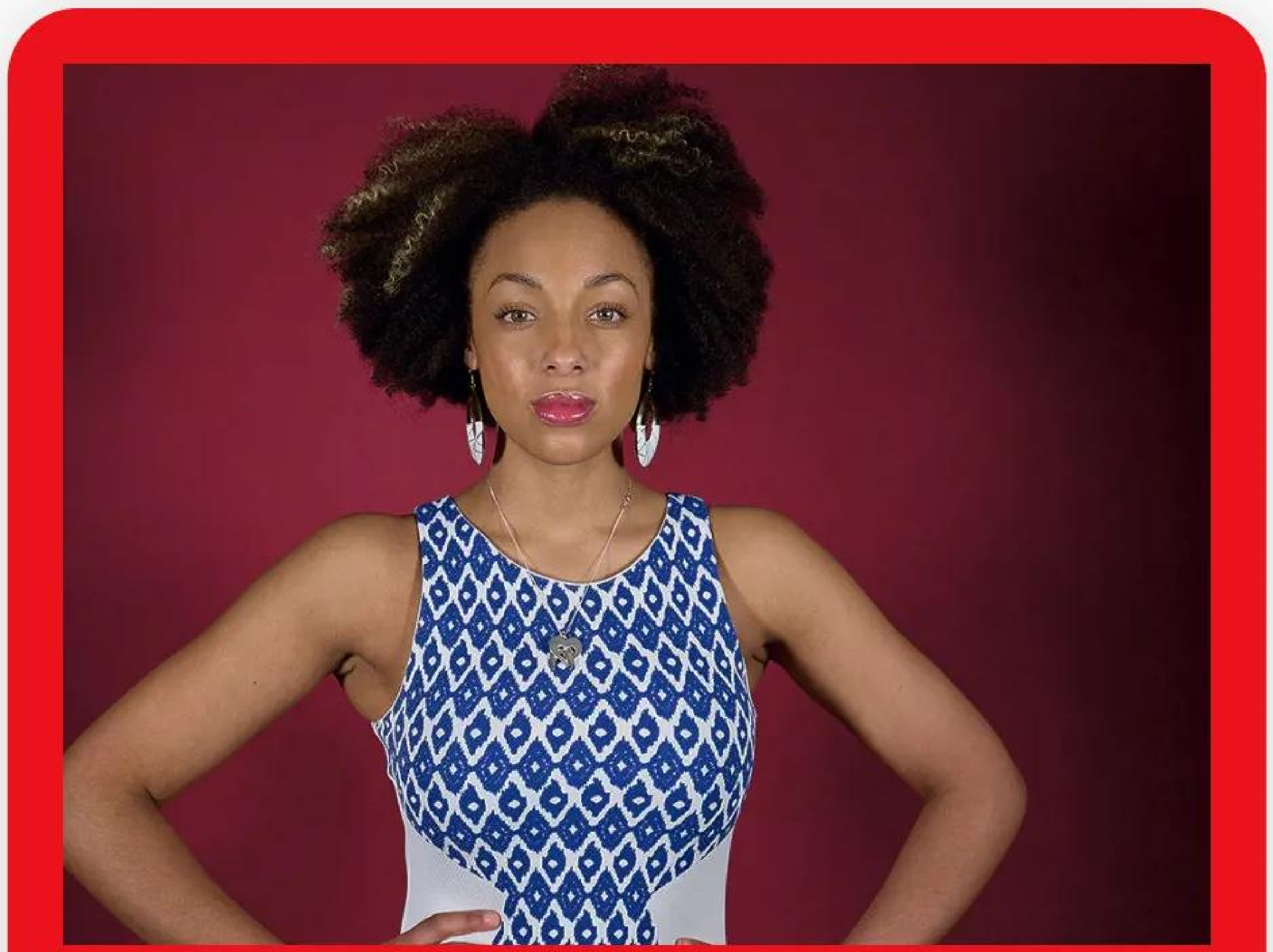
Adjust the shutter speed

To alter the shutter speed you need to turn the command dial on the top panel of your DSLR. To make it slower, turn the dial left; to make it faster, turn it right. If you have a beginner model then you can see the shutter speed setting through the viewfinder and on the back LCD screen, on the top row. If you have a more advanced model then you'll also see it on the small LCD on top of the camera.



Slow down time

If you want to capture the movement of a subject then you'll need to select a slow shutter speed. If you slow your shutter speed down to 1/60 sec or lower then you need to mount your camera on a tripod. For the image above we set the shutter speed to 1.6 seconds. To try this technique you'll need to shoot in low light, or use an ND filter attached to the front of your lens to stop down the light. Otherwise you won't be able to get a slow enough shutter speed.



Exposure warnings

There are limitations when shooting in shutter-priority mode. The shutter speed has a greater range of settings than the aperture, so if the aperture number starts flashing, it means the image is either too dark or too bright. You need to be careful because your camera will carry on letting you shoot, and you may produce results that are unusable. If this is the case you'll either need to adjust the shutter speed so it stops flashing or change the ISO. ■

Aperture priority mode

Blur backgrounds in portraits and still-life scenes or keep an entire landscape sharp

There will be times when you need to control the aperture in a photo to determine how much of the scene you want to keep sharp and how much you want to blur. When this is the case, put your DSLR into the Av mode.

Av stands for aperture value, and you'll find there are certain photography genres that lend themselves to this shooting mode, such as portraiture and still life. This is because you want to keep your main subjects sharp while blurring the background around your subjects to make them stand out.

Av is a semi-automatic exposure mode that gives you control over the aperture setting while the camera balances the shutter speed to the ambient light. You can also alter the ISO and exposure compensation setting in this mode. ▶

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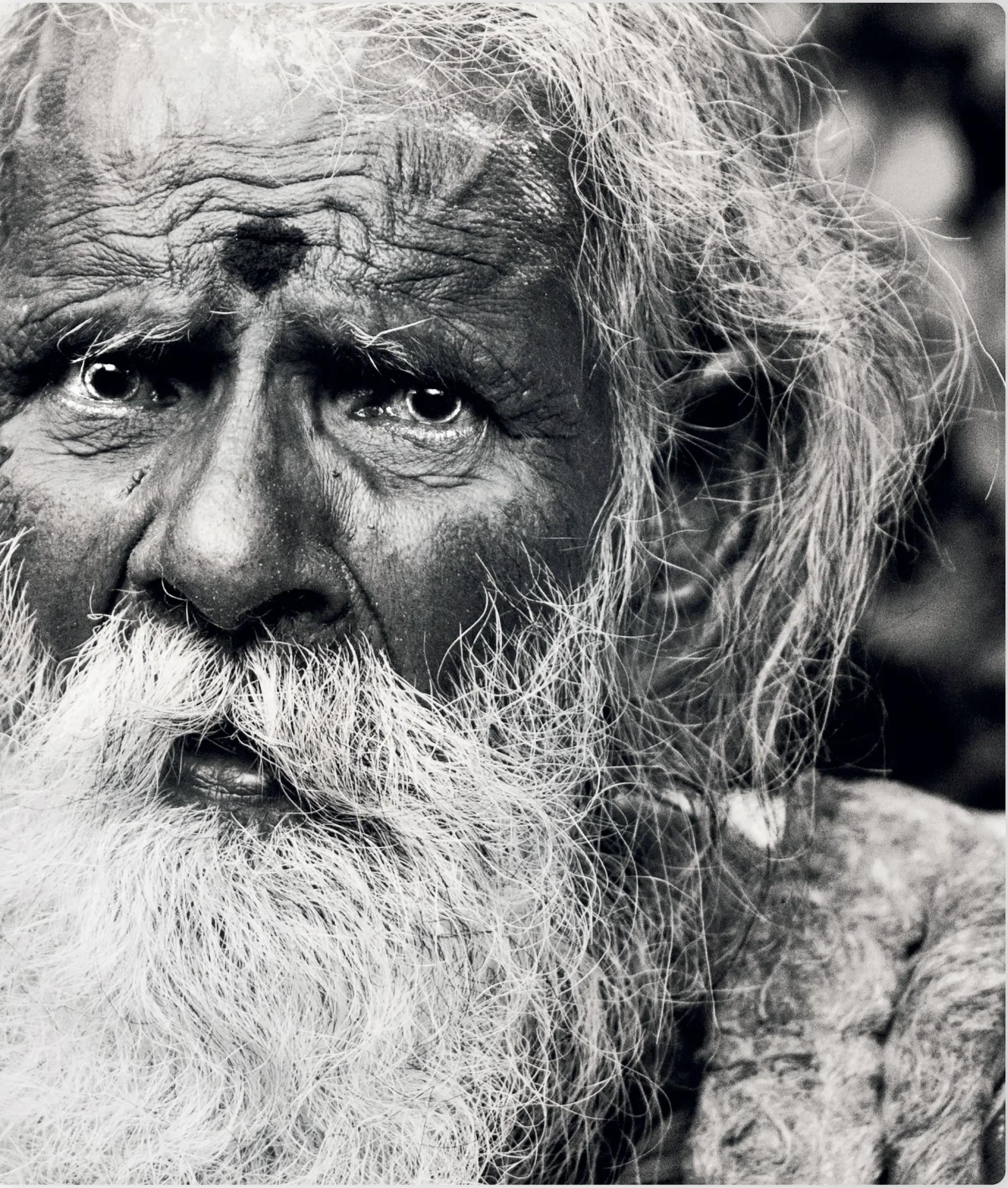
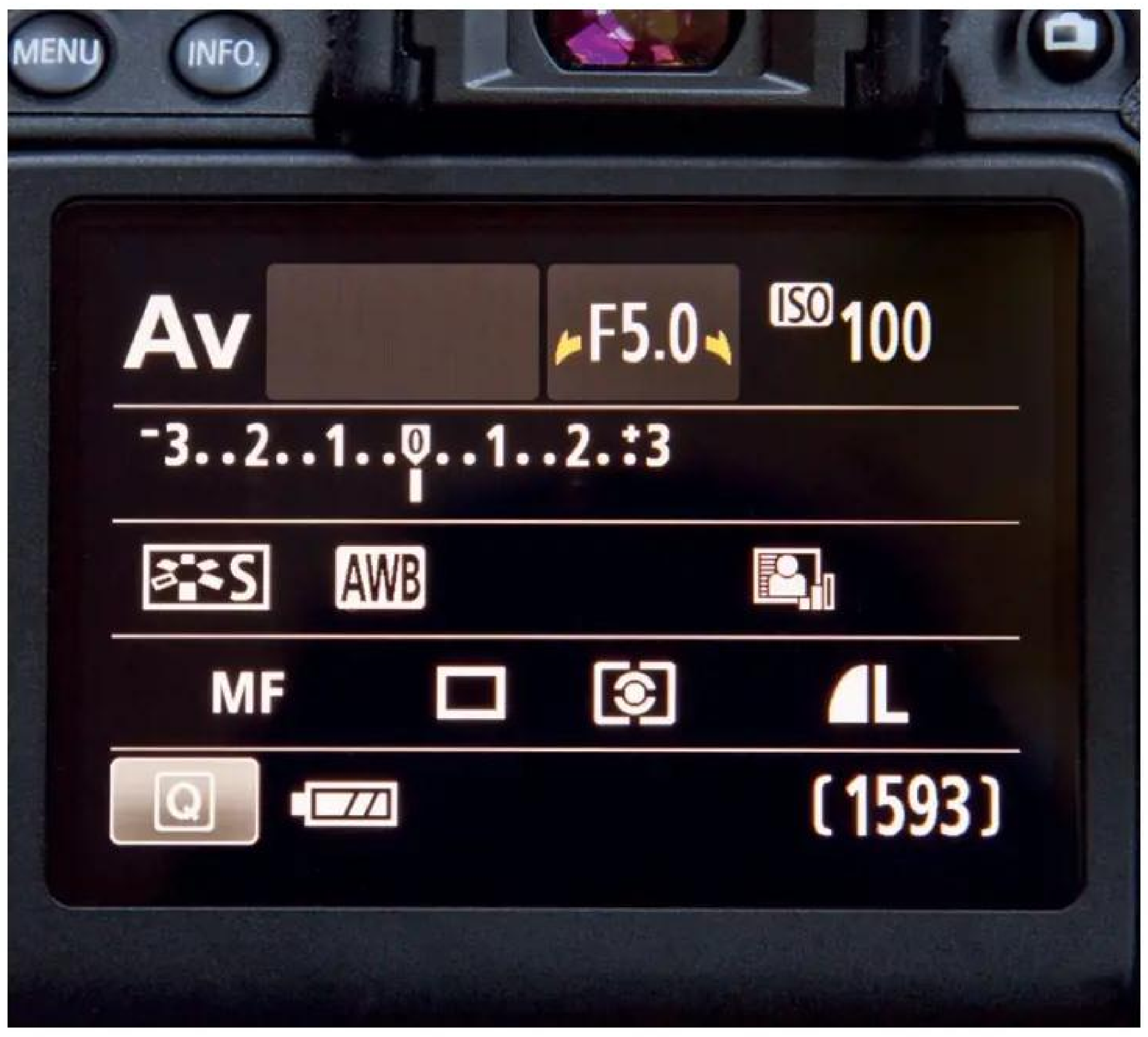


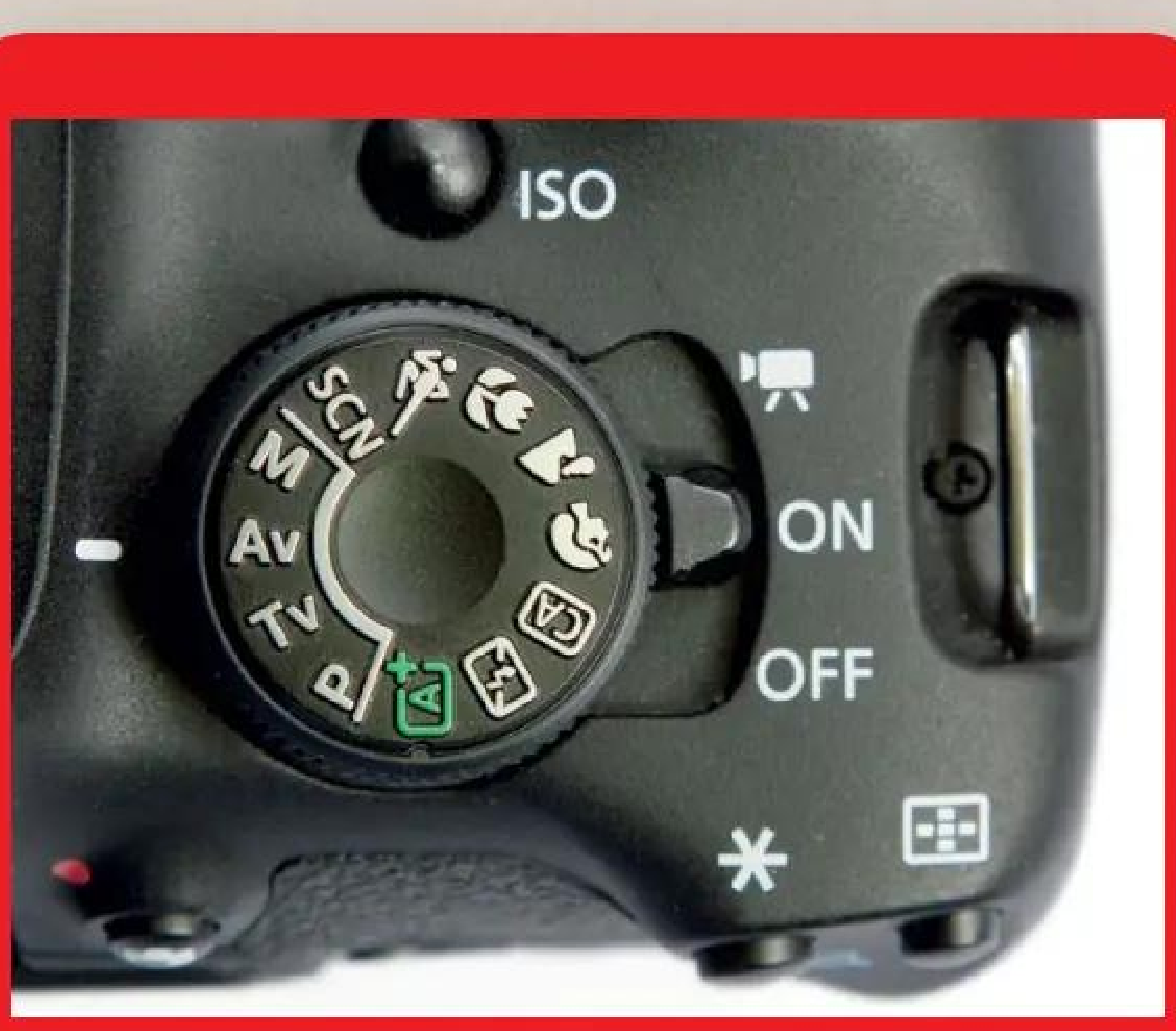
How much depth?

Control the amount of depth of field in your images using the aperture setting on your DSLR



What is aperture?

The aperture is the bladed circle mechanism that controls how much light enters through the lens. Photographers control the aperture using f-stop settings, which enables you to let in more or less light depending on what you're shooting. This controls how much of the scene is sharp. Your lens will have minimum and maximum f-stop settings. These typically range from f/3.5 to f/32, although many go wider or narrower than this.

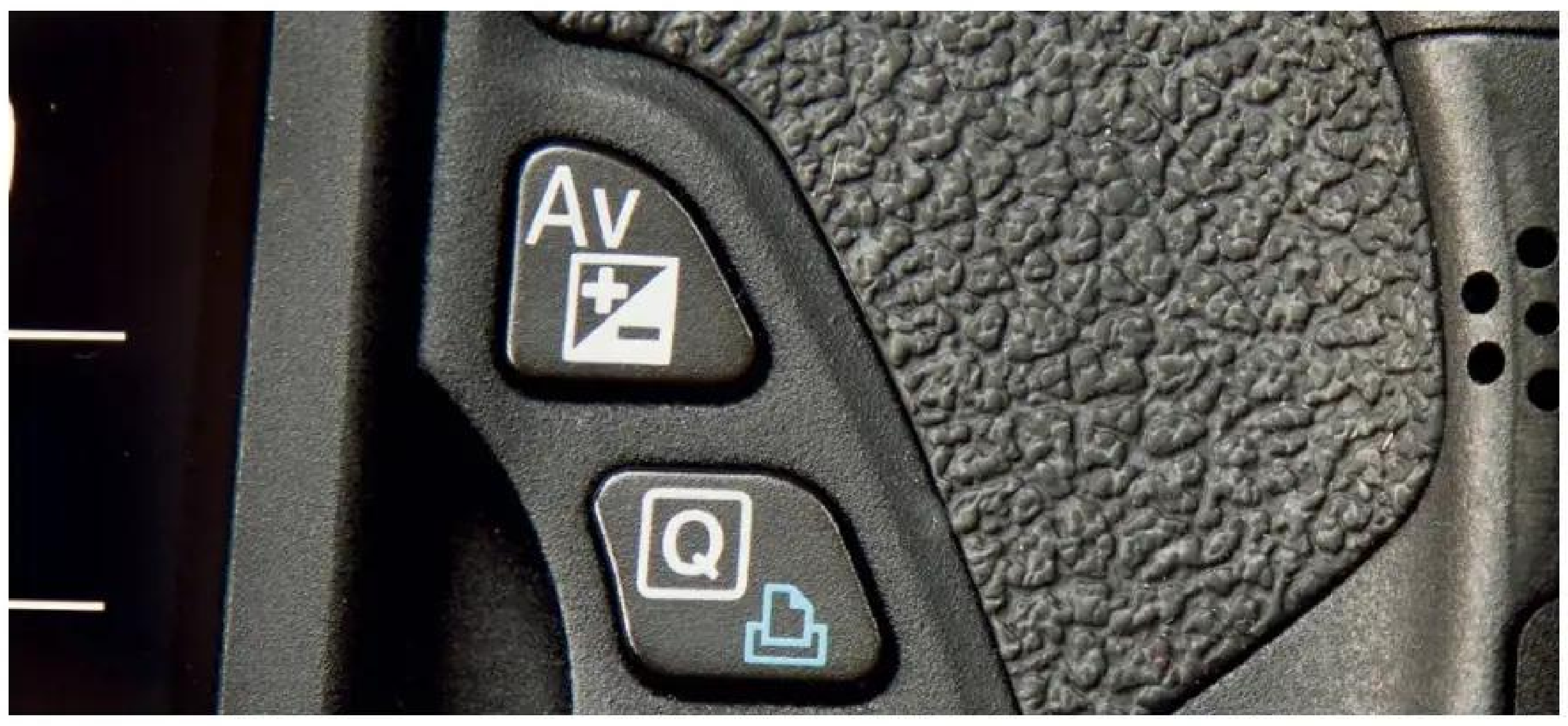


When to use Av mode?

To shoot in Av mode, first you need to engage the mode on the dial. You can now select the aperture using the command dial, and your camera will balance the shutter speed accordingly. Even though you're controlling the aperture, you need to keep an eye on the shutter speed, particularly when using high f-stop numbers. The camera will select a shutter speed to give the correct exposure, but it may be too slow to be able to hold the camera steady enough to avoid camera shake. To be on the safe side, make sure that the camera has set a shutter speed of 1/60 sec or faster when holding the camera.

Shallow depth of field

If you hear photographers use the expression 'shallow depth of field,' they are talking about blurring out parts of the image while keeping one part sharp and in focus. This creates a dreamy and stylised effect that many photographers love to use. To do this you need to set your aperture to around f/4.0. Some lenses go as wide as f/1.2. If you use wide apertures such as this, you need to be highly accurate with your focusing. This is especially true when shooting portraits (keeping the eyes sharp) as the wide aperture will blur out much of the scene, keeping only a small part sharp.



Quick control

Like any of the semi-automatic shooting modes, in Av mode you have the option to adjust many other camera settings. This includes altering the ISO and exposure compensation features. To access all the available options, press the Q button on your camera and navigate the options using the LCD screen.

Wide depth of field

If you want to keep everything in the scene sharp from front to back, shoot using a narrow aperture. These come in handy when capturing landscapes. A narrow aperture setting typically starts at around f/11 and goes up to f/22 or f/32. The higher you turn the number up, the smaller the aperture becomes in the lens, letting through less light, but making everything appear sharp. Of course, there are other factors that will determine how the scene is rendered. These include how far the foreground subject is from the lens, and how far the foreground subject is from the background.

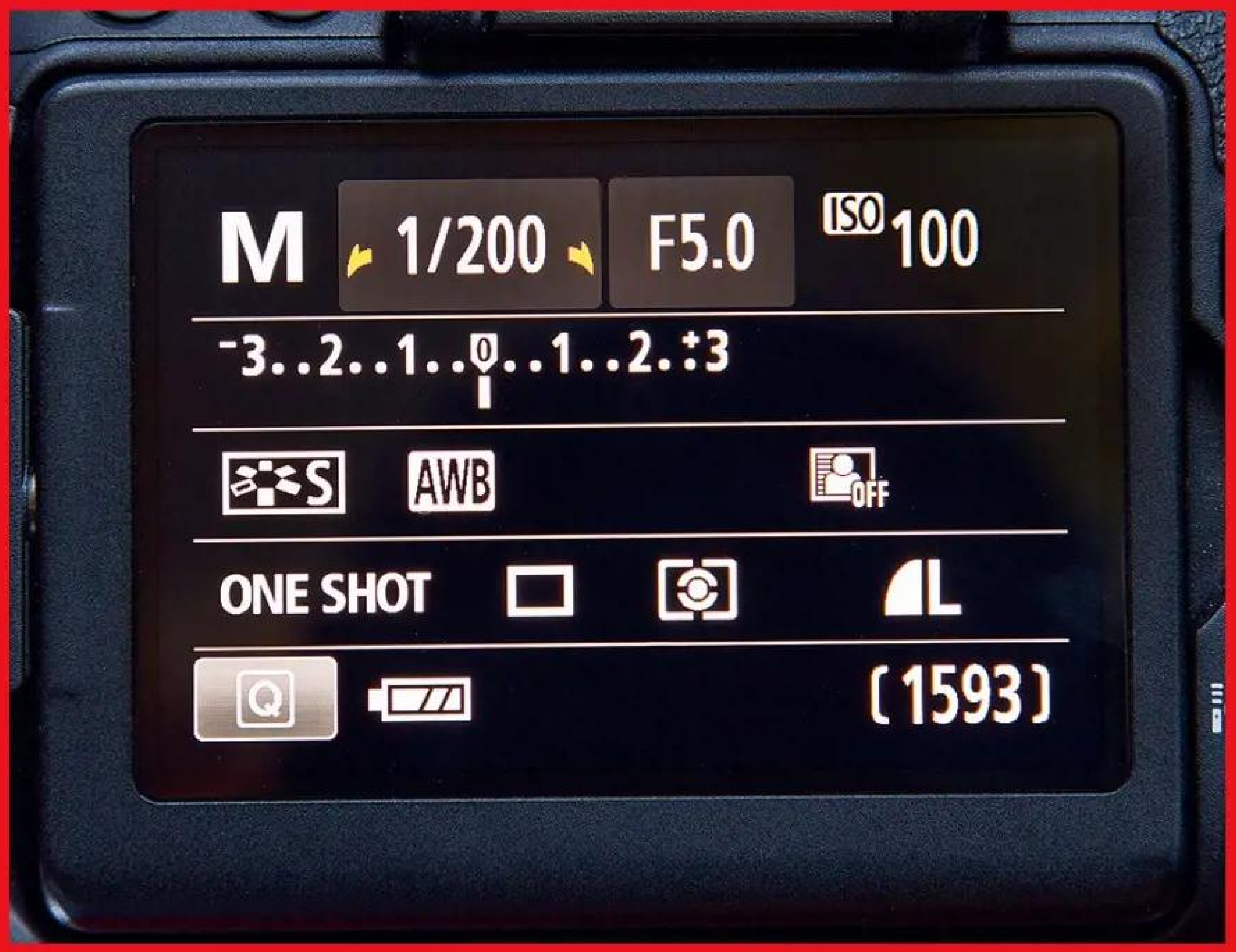
Manual mode

Take full creative control of your DSLR and learn how to balance exposures using the manual mode

The manual exposure mode enables you to decide the appropriate aperture, shutter speed and ISO for a given scene. Photographers tend to use it when shooting under controlled lighting conditions, such as when shooting in a studio environment. The manual mode may seem a bit daunting when you're starting out, and it also takes a bit of practice, but if you can understand how the shutter speed, aperture and ISO work together, then you're well on your way to getting better results. ▶

Manual mode explained

Switch your mode dial to M and start balancing all the camera settings yourself for complete creative control

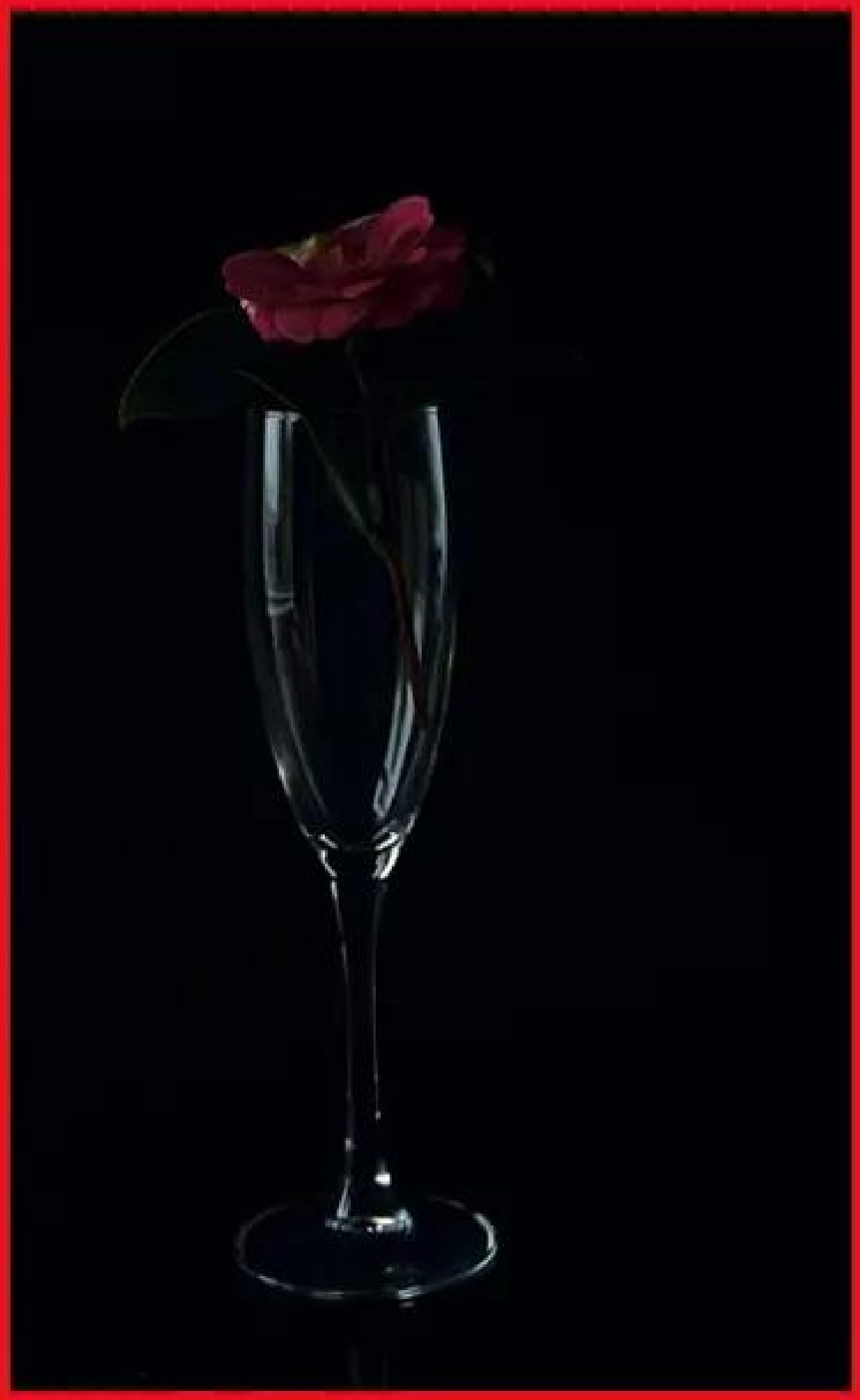


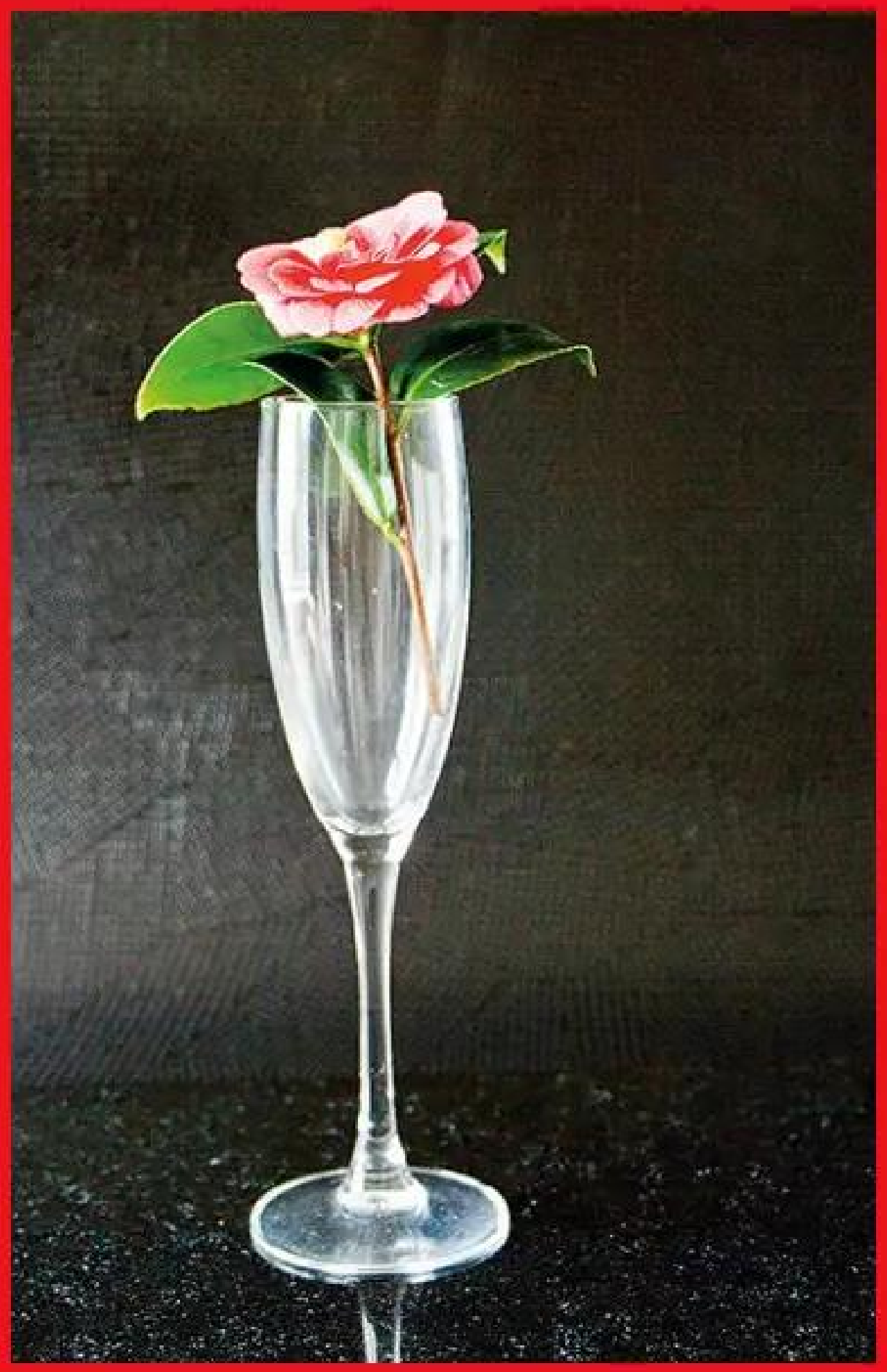
Beginner models

On beginner models, use the main command dial to alter the shutter speed and then hold the plus and minus button while turning the dial to alter the aperture. Alternatively, press the Q button and move the box over the setting you wish to alter, then turn the command dial.

Enthusiast and advanced models

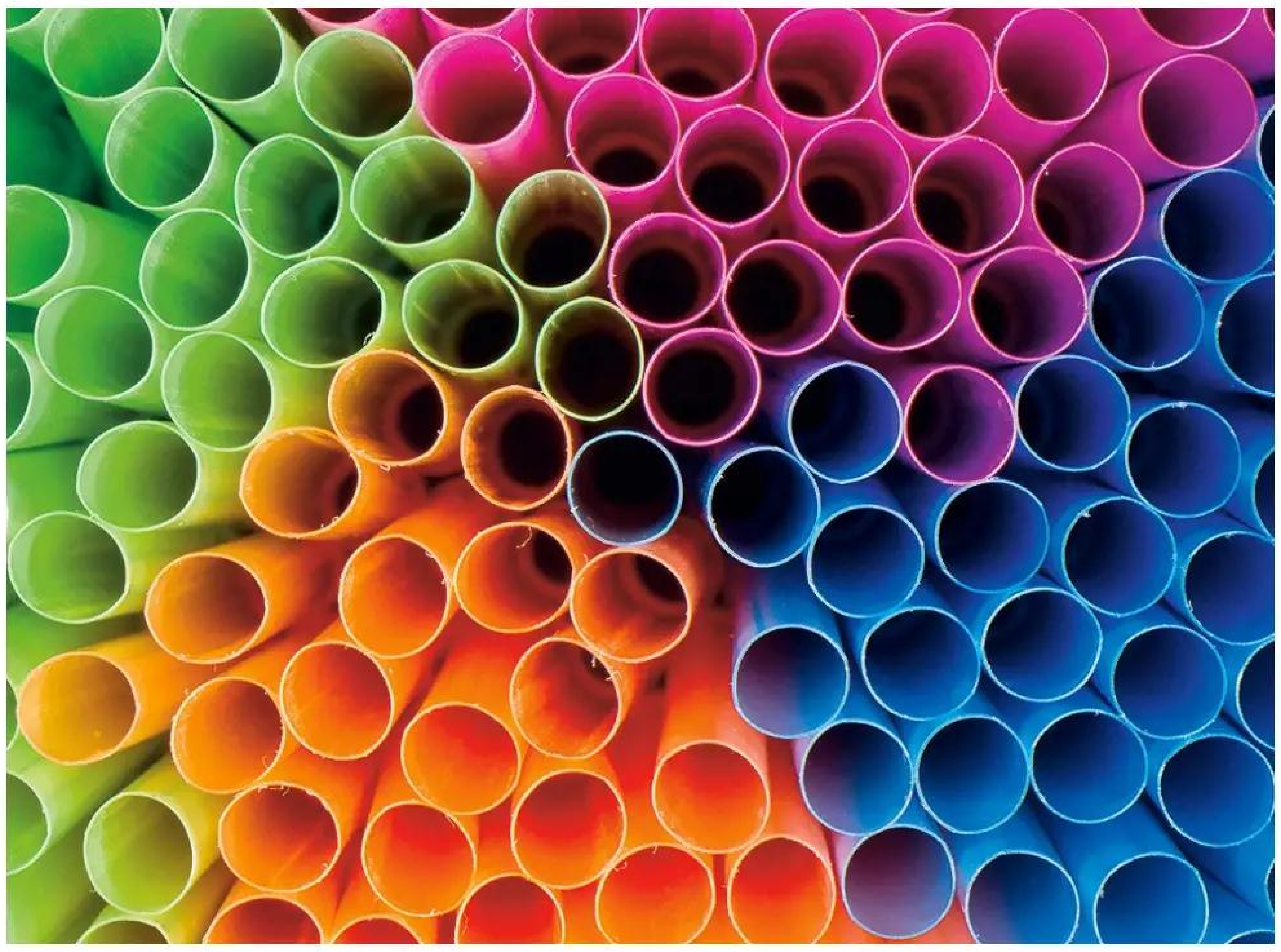
If you own an advanced or an enthusiast model, you alter the exposure settings slightly differently, because you don't have the beginner plus/minus button. Instead, use the front command dial to change the shutter speed and the back-panel multi-controller to change the aperture.





The exposure meter

Once you know how to change the settings, what should you change them to? The aim is to balance the exposure meter (by adjusting the shutter speed, aperture and ISO) in the middle of the scales so you have a correct exposure. You'll find the exposure meter by looking through the viewfinder, or you can see it on the LCD screen. Just remember that the needle needs to sit in the middle of the scales when the scene is correctly balanced. If there's an arrow flashing to the left then you need to add more light. If you took the image without changing the settings, all you'd see is a black screen with little or no detail. This is because you haven't got enough light. If an arrow is flashing to the right, this means you have too much light, and your image will be too bright.



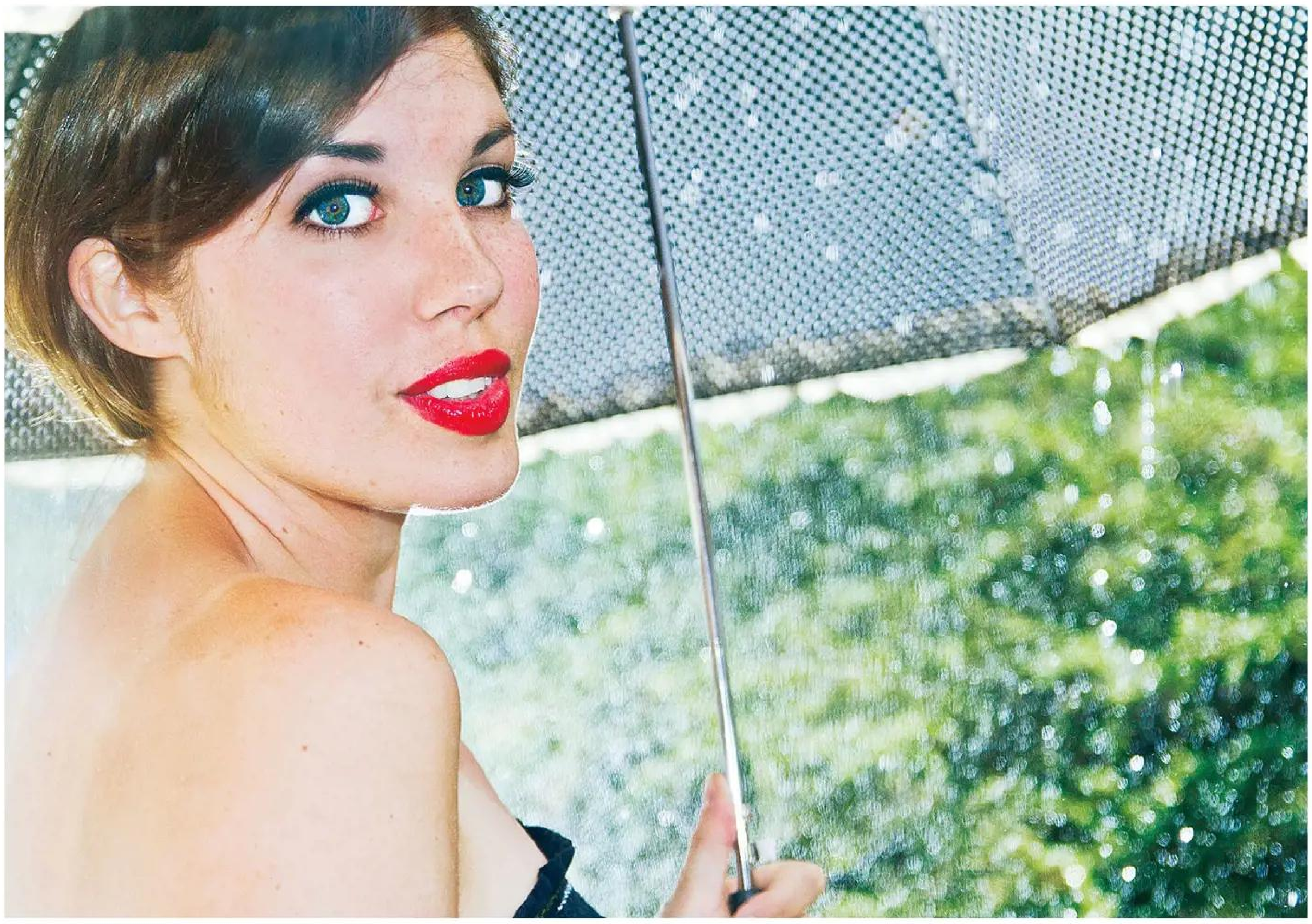
Subjects for manual mode

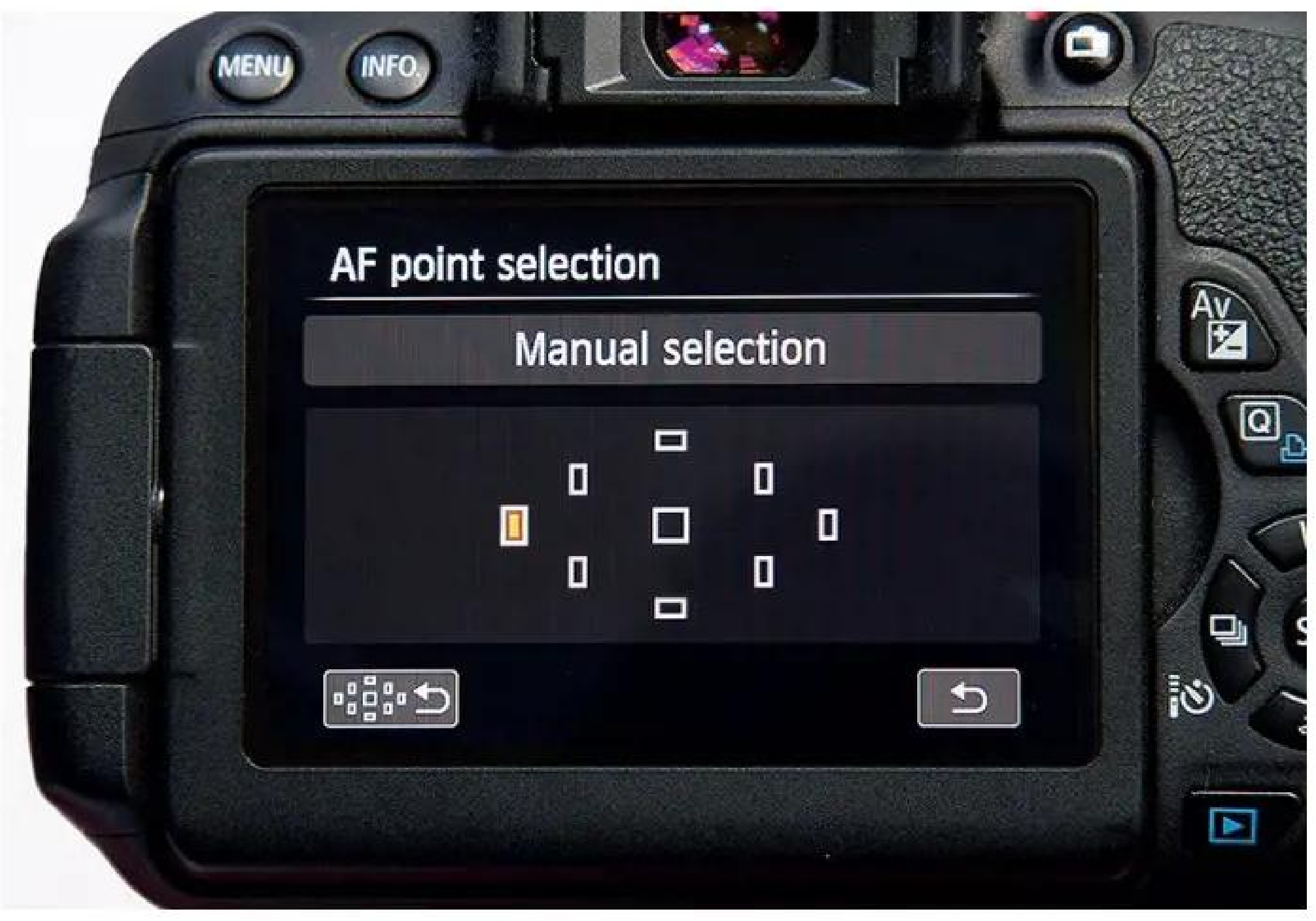
It's easier to use the manual mode when shooting under a constant light source, because the camera settings won't need to change between shots. That's why studio environments particularly lend themselves to manual mode. You may also want to use the manual mode when shooting still lifes. You have the time to balance the camera settings with this type of set up. Shooting action images outside can be tricky with manual mode, so avoid movement, and stick to still subjects.

AF-ON
RAW JPEG
START STOP
MENU
INFO.
LOCK
Canon

Live View mode

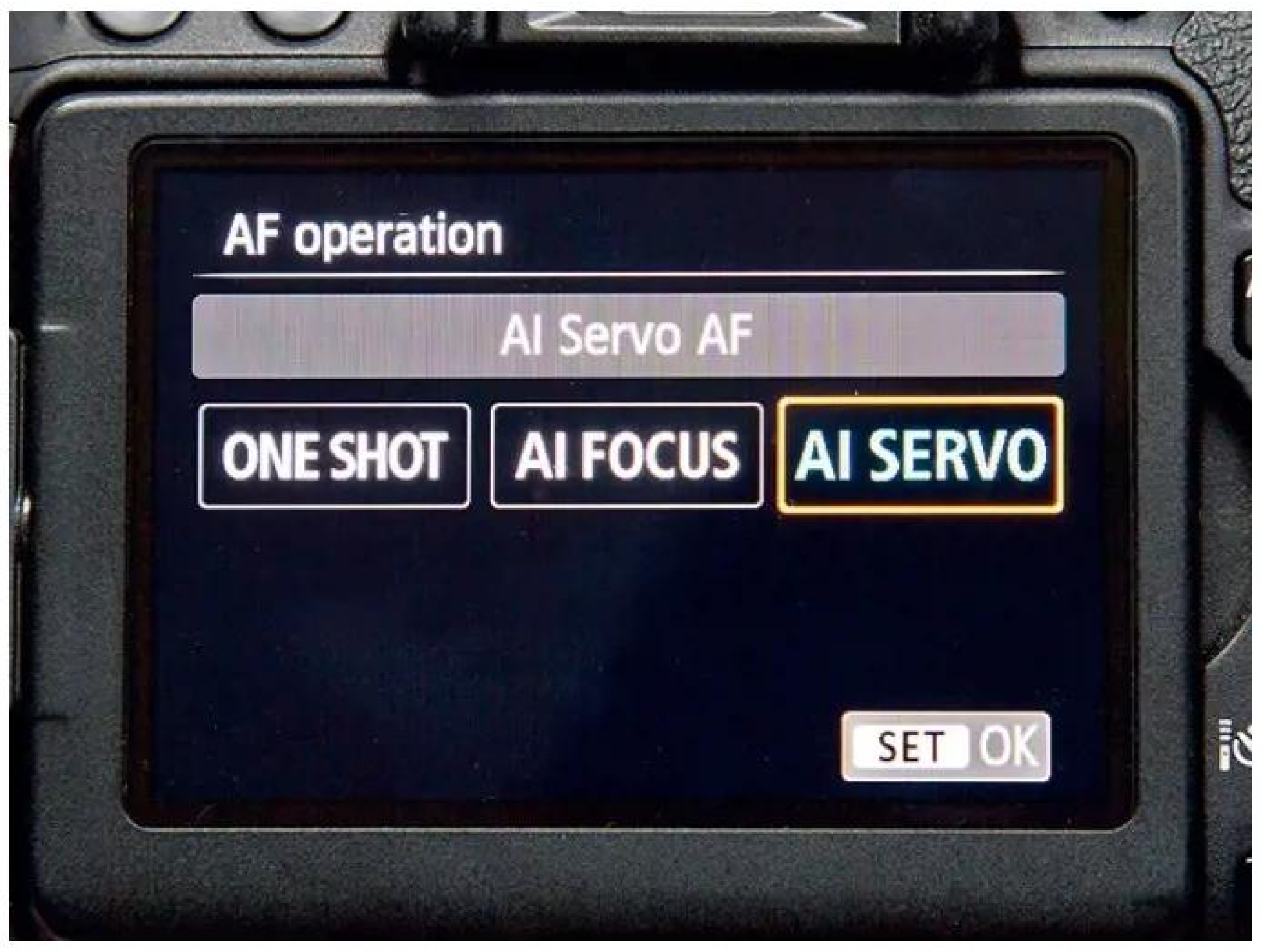
If you're new to photography it can be really helpful to balance the exposure using Live View mode. This way you can see if your image needs more or less light. Although the aim is to balance the needle in the middle of the scales, there are times when you may need to adjust the needle over or under the centre point. We call this over- or under-exposing. It's easier to visualise the final result if you can gauge how light or dark it is on the LCD screen. If you've selected a special Picture Style you can also preview how this will appear on the screen.





AF point selection

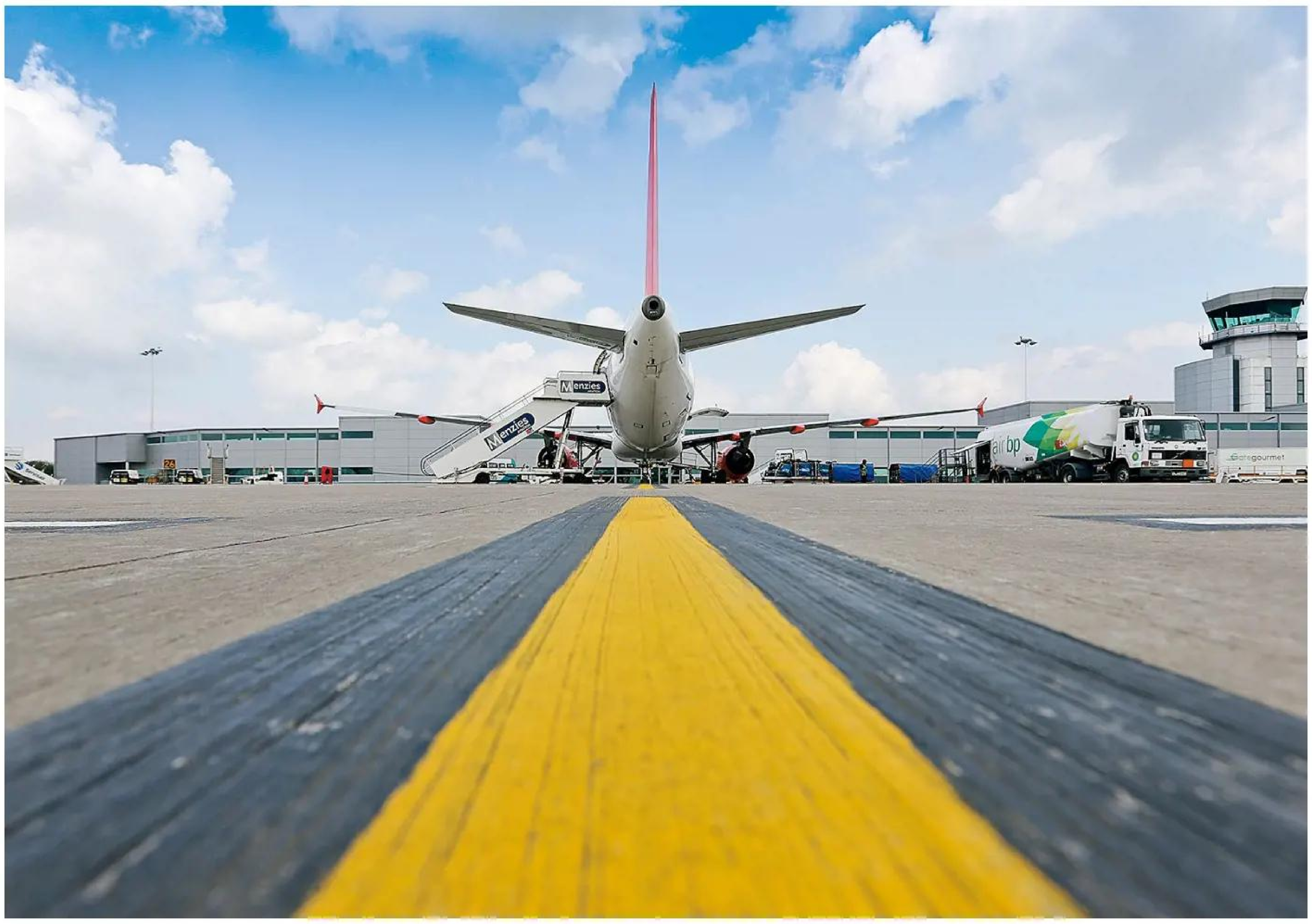
Manual selection



AF operation

AI Servo AF

ONE SHOT AI FOCUS AI SERVO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Focusing and lenses

Match the appropriate lens with your creative needs to ensure great results, no matter what the setting

58 **Your guide to camera lenses**
Discover how to choose the most appropriate lens for any given scene with our introduction to digital camera optics

62 **Sensor size matters**
Discover how your choice of lens is affected by the size of your Canon DSLR's sensor

66 **Autofocus mode**
Let your Canon camera take complete control of the focusing for you

68 **Select the focus point manually**
Choose the exact part of the scene that you want to be in sharp focus

70 **Choose the focus mode**
Learn how to select the correct focus mode to get the best possible results

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See page 194 for more

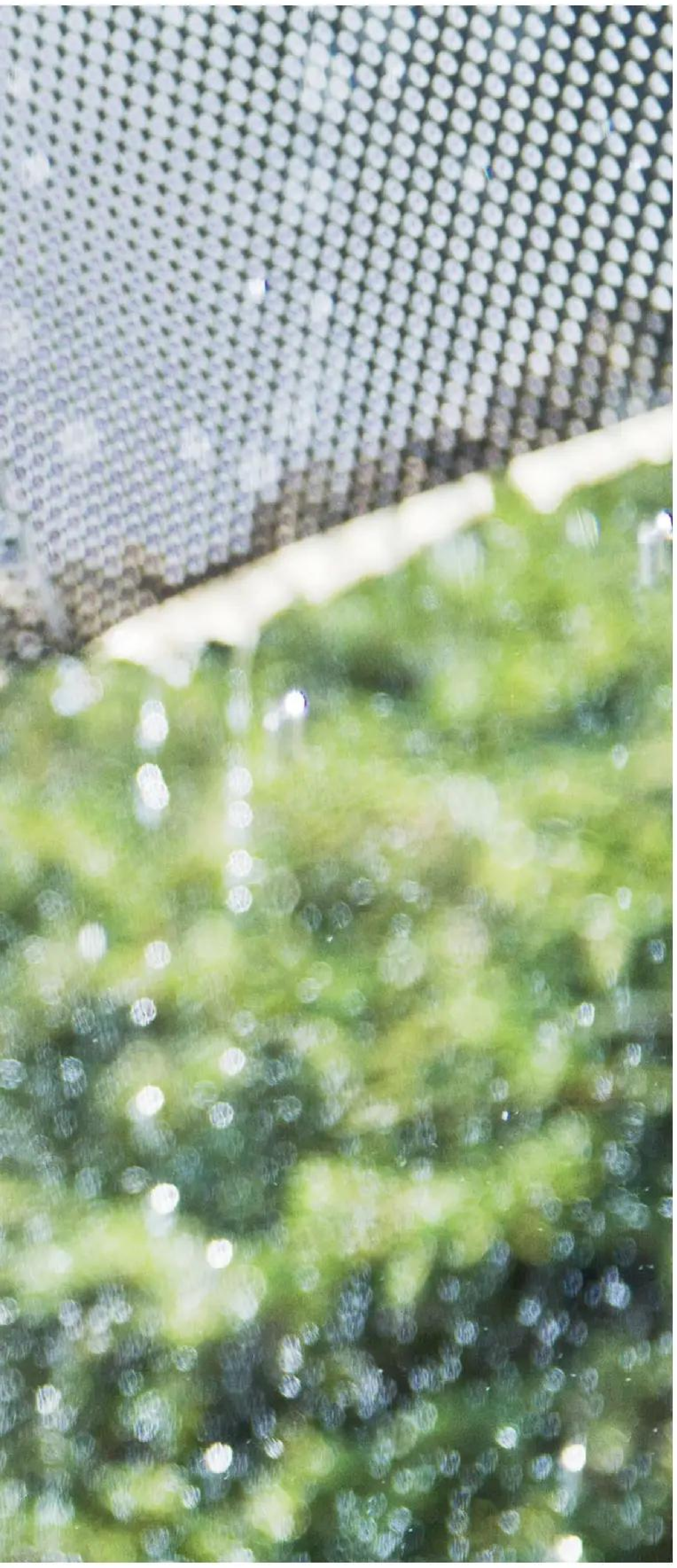
Your guide to camera lenses

Discover how to choose the most appropriate lens for any given scene with our introduction to digital camera optics

There will come a time when you decide to buy an additional lens for your camera to increase your creative options. For the beginner it can seem daunting when you start shopping around for a new lens. But it's not as tricky as you may first think. There are only really a few considerations you need to take into account when purchasing a lens. These are: the cost (as a general rule, you should spend as much as you can afford), the focal length (how wide or how zoomed you need it to be), and the minimum and maximum aperture range (how sharp or blurred you want your pictures to be).

Canon produces two types of lenses, which are EF and EF-S. EF lenses are marked with a red dot, and EF-S with a white. We'll explain what these mean in a few pages, but for now just check what dot or dots your Canon DSLR has. If you have both the red and white dots, your camera can use either lens, but if you just have a red dot, you'll need an EF lens (the EF-S won't fit your camera mount).

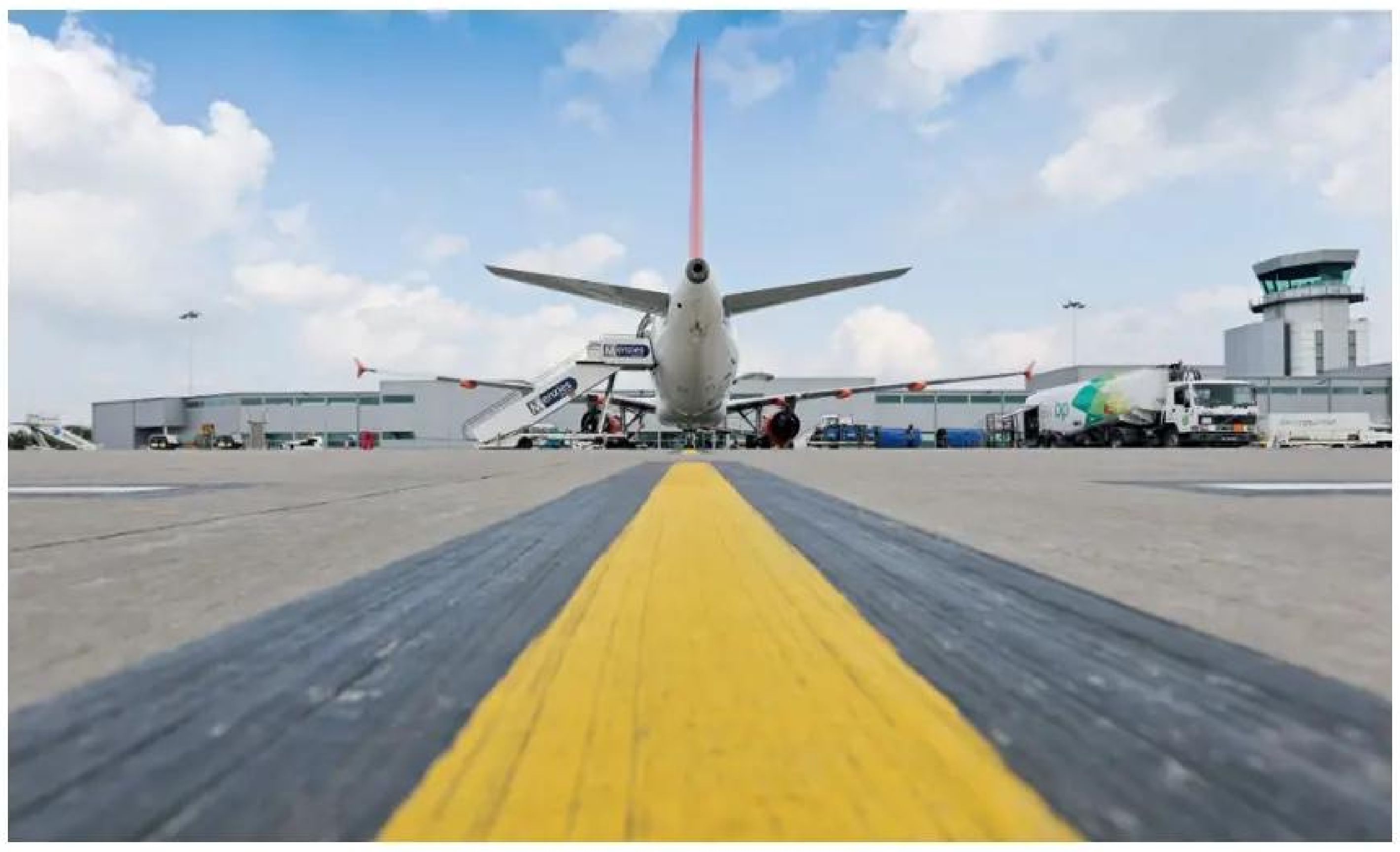
The focal length of a lens is measured in millimetres (mm). Your lens will have either a variable focal length (for example, 24-70mm) or it will be a fixed length (for example, 85mm). If you need something versatile, then a variable length is the better choice, but fixed focal length lenses generally produce higher quality results. When it comes to focal length, just remember that the lower the number,



the wider the view, and the bigger the number, the more zoomed in you'll be.

The next consideration on the list is the aperture range. On the kit lens it appears like this, 1:3.5-5.6. This means the minimum and maximum aperture range will vary depending on where the focal length of your lens is set to. For example, on your kit lens if you were set at 18mm, then your aperture can open up to f/3.5. But if you zoomed into 55mm, then your aperture setting can only go as wide as f/5.6. Some lenses have fixed minimum and maximum apertures, for example, on the Canon EF 24-70mm f/2.8, the aperture will open up to f/2.8 regardless of what focal length your lens is set at. These types of lenses tend to be more expensive, so they may be a bit out of the price range of a hobbyist.

With so many lenses on the market, it can be a little overwhelming. Try to match your shooting needs with the lens you want



A wide-angle lens can produce stunning results if you get down low and make use of leading lines in the scene

Canon
35mm
IMAGE STABILIZER
ULTRASONIC

Lenses with fixed focal lengths produce high-quality results, and because there are fewer moving parts in the construction (compared with a variable focal length lens), they can be very good value for money

The standard kits lens is a good starting point for beginners. You can use it to shoot a variety of subject matter

LENS TYPES...

Popular lenses

You can shoot almost anything at all with these three basic types of lens in your kit bag

Kit lens

Canon
EFS 18-55mm

The standard kit lens is a good place to start. Its focal range is 18-55mm. With the lens at the widest setting (18mm), this is good for shooting landscapes, cityscapes or large groups of people. If you start moving the focal length forwards you'll notice the view zooms into the scene. At the other end of the scale, at 55mm, you can shoot portraits or close-up still lifes.

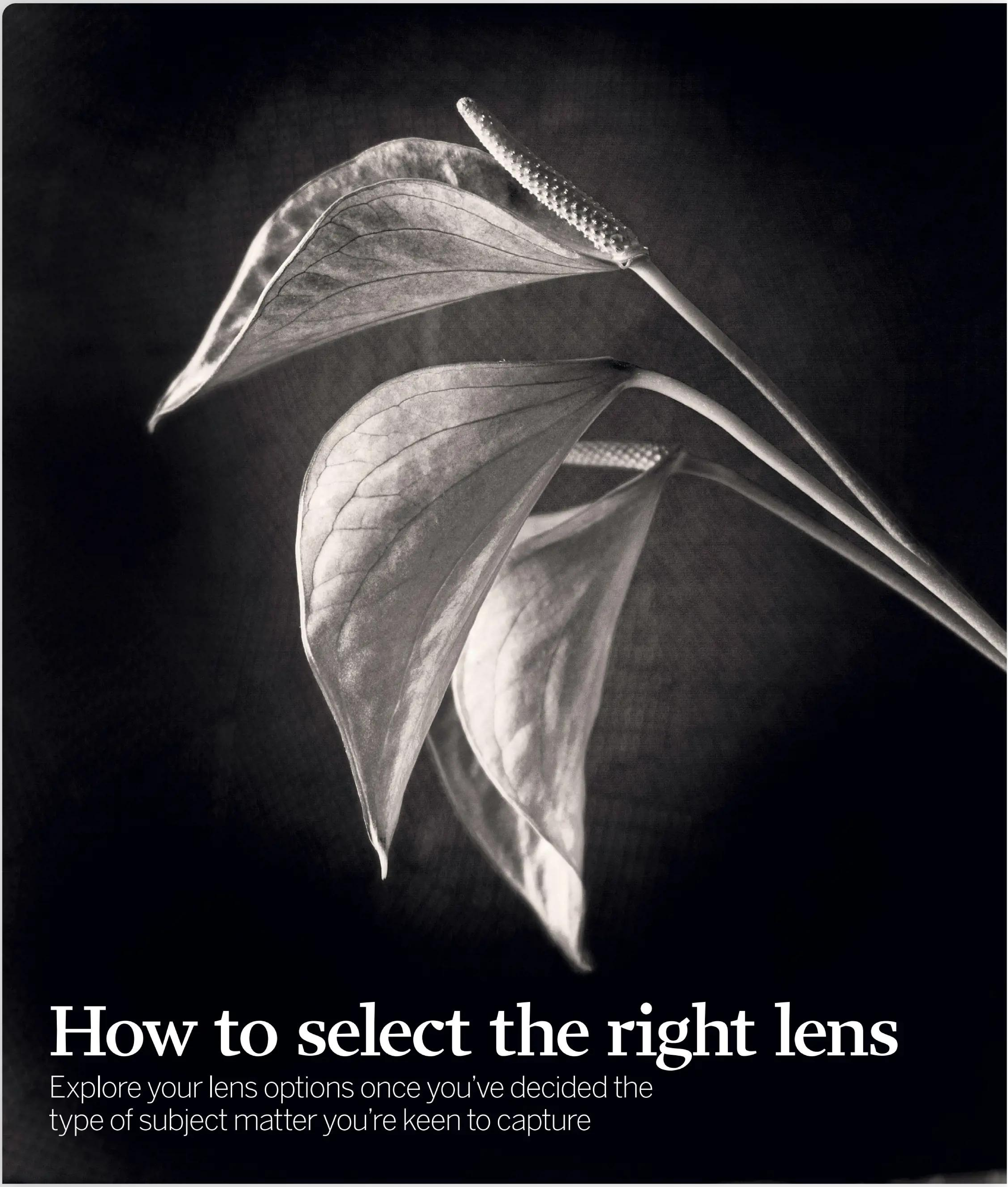
Zoom lens

If you need to get in close to the action, you'll need to purchase a telephoto zoom lens. These vary between having a variable focal range to having a fixed focal length. When shooting with long telephoto lenses, you need to increase your shutter speed setting to compensate for the long length. Also, telephoto lenses don't come cheap, because they are complex in construction. They are well worth it, though, if you're keen to capture wildlife or sports up close.

Standard zoom

Canon
24-70mm

A standard zoom such as a 24-70mm lens is an extremely useful lens to have to hand. Not only can you shoot a variety of subject matter with this lens, from portraiture to architecture, but this one from Canon produces high-quality results. If you're still unsure about what direction you want to take your photography, and you have the funds to purchase a new lens, this is



How to select the right lens

Explore your lens options once you've decided the type of subject matter you're keen to capture

Lots of lenses in the Canon range include image stabilisation technology. On a Canon lens it's marked with an IS switch. This stands for Image Stabilization. This essentially helps you to produce sharper shots when shooting with your camera by hand. To engage the feature, switch IS on. The only time you should switch this off is when your camera is mounted to a tripod.

What lens or lenses to invest in will be determined by your interest's. So if landscape photography is a priority, then a wide-angle lens is a must. They typically range from 10-35mm in length. Wide-angle lenses may cause distortion, for example, they won't be any good for portraits because they can bend the face, making the nose look big. They can also make buildings look distorted if shooting from a low angle. However, in some circumstances you can use this flaw to your advantage to create fun, dynamic pictures.

If shooting sports or wildlife is more your thing, then a telephoto lens will be a wiser investment. These start at around 70mm and go all the way to 800mm. Some lenses in the telephoto range come with a variable focal length, whereas others are fixed. Telephoto lenses tend to be quite heavy so it may also be worth investing in a monopod for extra support. You should mount the monopod to the lens, which will include a mount for this reason.

For shooting portraiture, there are a few different types of lenses that are good for this genre. For example, the 70-200mm telephoto lens is great for producing flattering results. It also blurs the background behind your subjects, making them stand out. A fixed focal length lens such as a 50mm is also good for portraiture. You can open the aperture to a wide setting on this type of lens, again producing that nice, soft background effect.

If you're still unsure, then for now get used to handling your kits lens, and when you start to feel more confident in the medium, invest in another. One last word of advice – If you purchase a third-party brand, such as a Sigma or Tamron, make sure it has the correct Canon fitting.

For photographing wildlife, a zoom lens is a good investment, enabling you to get really close to your subject matter

CANON MACRO LENS EF 100mm 1:2.8 L IS USM
Canon
MACRO 100mm
IMAGE STABILIZER
ULTRASONIC

If you want to capture extreme close-ups, a macro lens is a wise choice. For a cheaper option, use a set of extension tubes mounted to your kit lens

CANON LENS TS-E 24mm 1:3.5 L II
Canon
TS-E 24mm

Tilt-and-shift lenses are usually used to photograph architecture and landscapes. They look different from other lenses because they have an extra control on the side that shifts the plane of focus and angle. Be warned that they are very expensive!

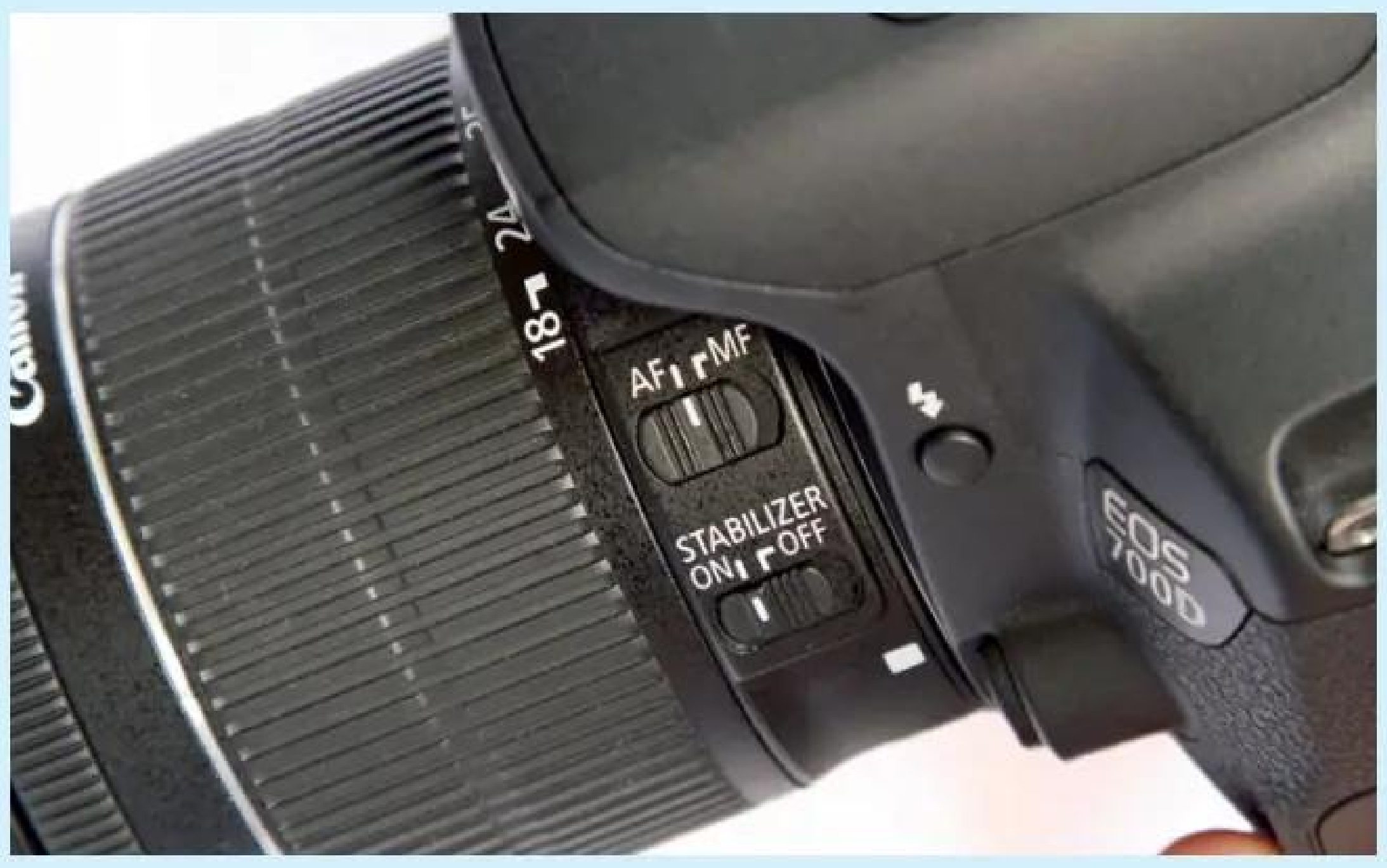
STEP BY STEP

Now try this...

What on your lens does what?

Zoom in and out

To adjust the focal length of your lens, twist the main barrel of the lens with your left hand. If you're shooting with a long telephoto lens, you may want to mount it on a monopod or a tripod for extra stability. Some of the bigger lenses weigh a tonne!



Stabilise the image

Next you need to decide if you want to engage the IS feature. You should switch it on when shooting handheld, but you don't really need it when shooting at a shutter speed setting of 1/1000 sec or faster. Turn it off if your camera is mounted on a tripod.

Achieve focus

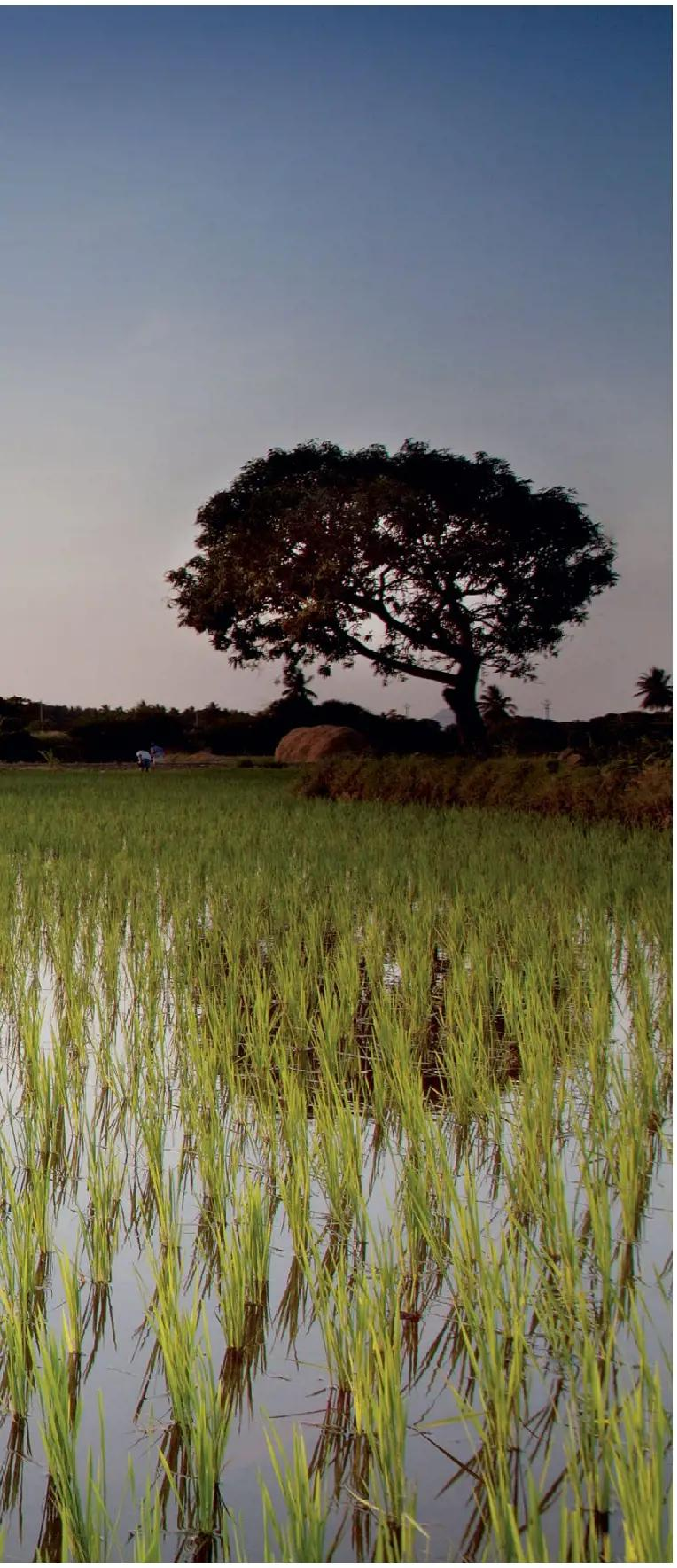
Finally, you need to focus. You can use the automatic focusing feature marked AF on your lens. If you want to take control of the focusing yourself, however, then switch the setting to MF (manual focus) and twist the front ring of your lens until the image is sharp.

Sensor size matters

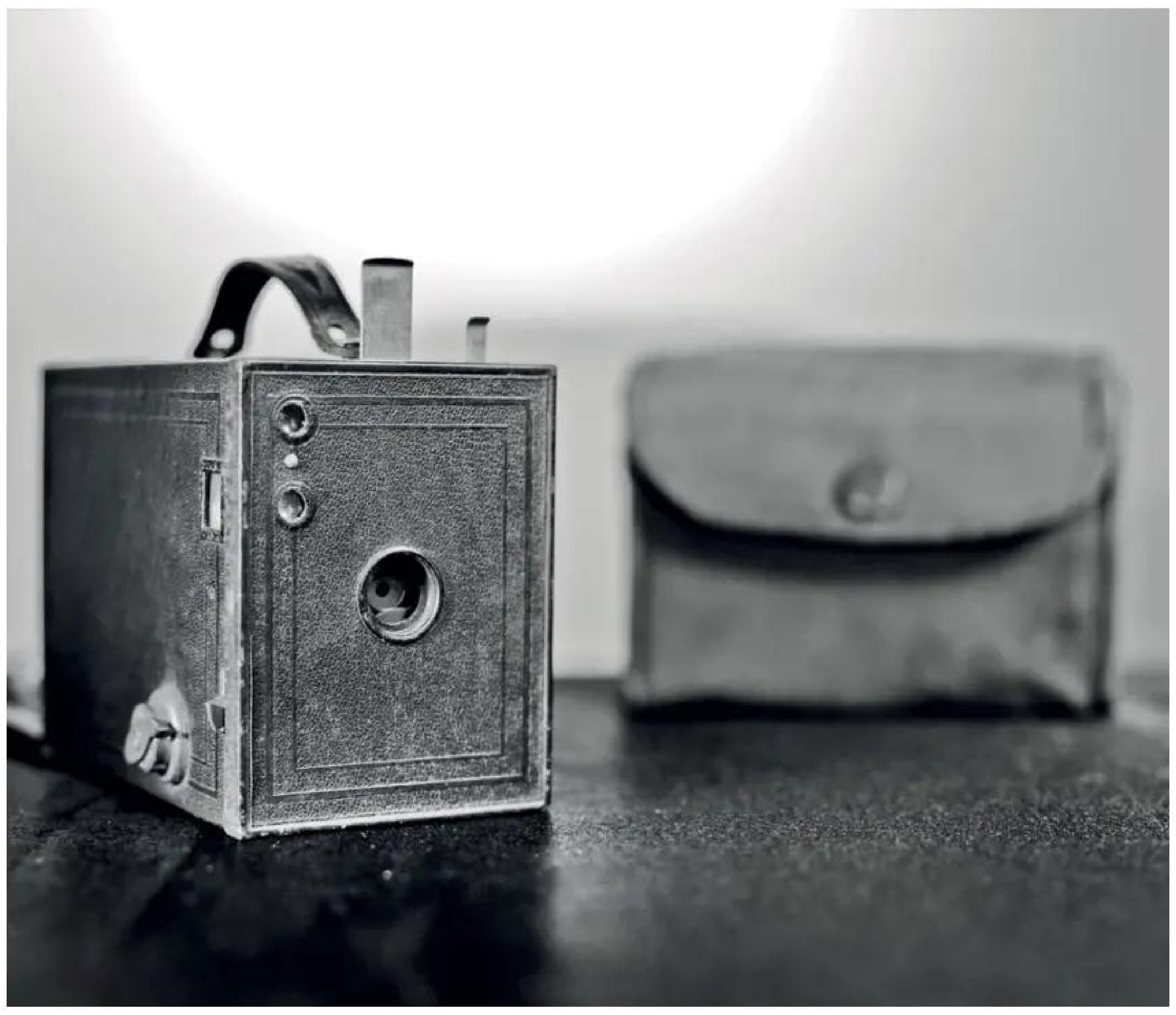
Discover how your choice of lens is affected by the size of your Canon DSLR's sensor

The sensor in your camera is where your images are recorded, before they are sent to be processed, and finally stored on your memory card. It's a vitally important part of your camera, and sensors from compact cameras right the way to DSLRs come in all different sizes. Canon produces two types of camera sensors in their DSLR range. These are APS-C and full frame. Full frame, as you expect, is larger in size compared to the APS-C sensor. All the DSLRs in the current Canon Professional range and the EOS 6D from the enthusiast range have a full-frame sensor. Everything else has an APS-C. It's important to understand the difference between the two because it affects the field of view and the focal length of your lens. But how, you may ask?

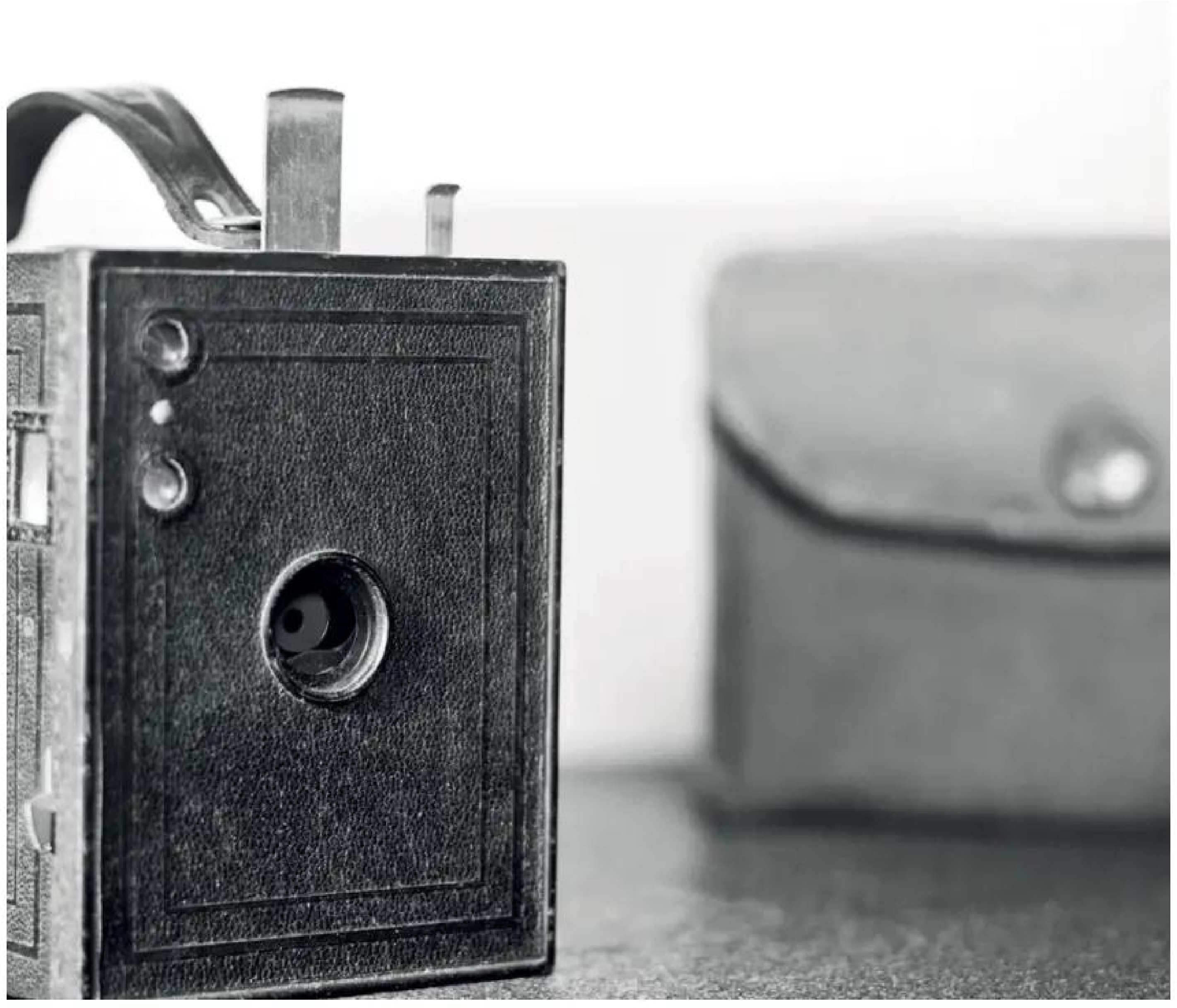
In our example (on the right-hand side of the page) we've set up a Canon EOS 5D MK III (with a full-frame sensor) and a Canon EOS 7D (APS-C crop sensor) on the same spot, both with a 50mm lens attached. As you can clearly see, the image from the 5D MK III has produced a wider view than the image taken with the 7D. But why? It's because the sensor on the 7D is not as big as the full-frame sensor so it cuts into the view of the lens. This means that a 50mm lens will not show a 50mm view on a crop-factor sensor. Instead, the 50mm lens becomes the equivalent of an 80mm lens.



Here we've set up two cameras in the same spot to show you the difference in how the sensors work



With a full-frame sensor and a 50mm lens you can see the full view of the scene



This image is taken at the same spot with the same lens as the one above, but this time with a crop-factor sensor

To work this out there's a very simple equation you can use. Take the focal length of the lens, in this case it's 50mm, and multiply it by 1.6. Why 1.6? This is the crop ratio of how much smaller the crop-factor camera sensor is to the full frame. So 50 times 1.6 is 80 – and there we have the equivalent view. All the Canon APS-C cameras in the current range come with an x1.6 crop-factor sensor.

Canon also produces two types of lenses. These are EF and EF-S. EF are marked with a red dot and EF-S with a white dot. The EF-S lenses are designed only for the APS-C sensor, and they will not fit on a full-frame camera. EF lenses can go on any camera body. Turn the page for a diagram of the difference between the resulting images. ▶

SENSOR SIZES

Quality considerations

Some further information on the Canon camera sensors

Full frame

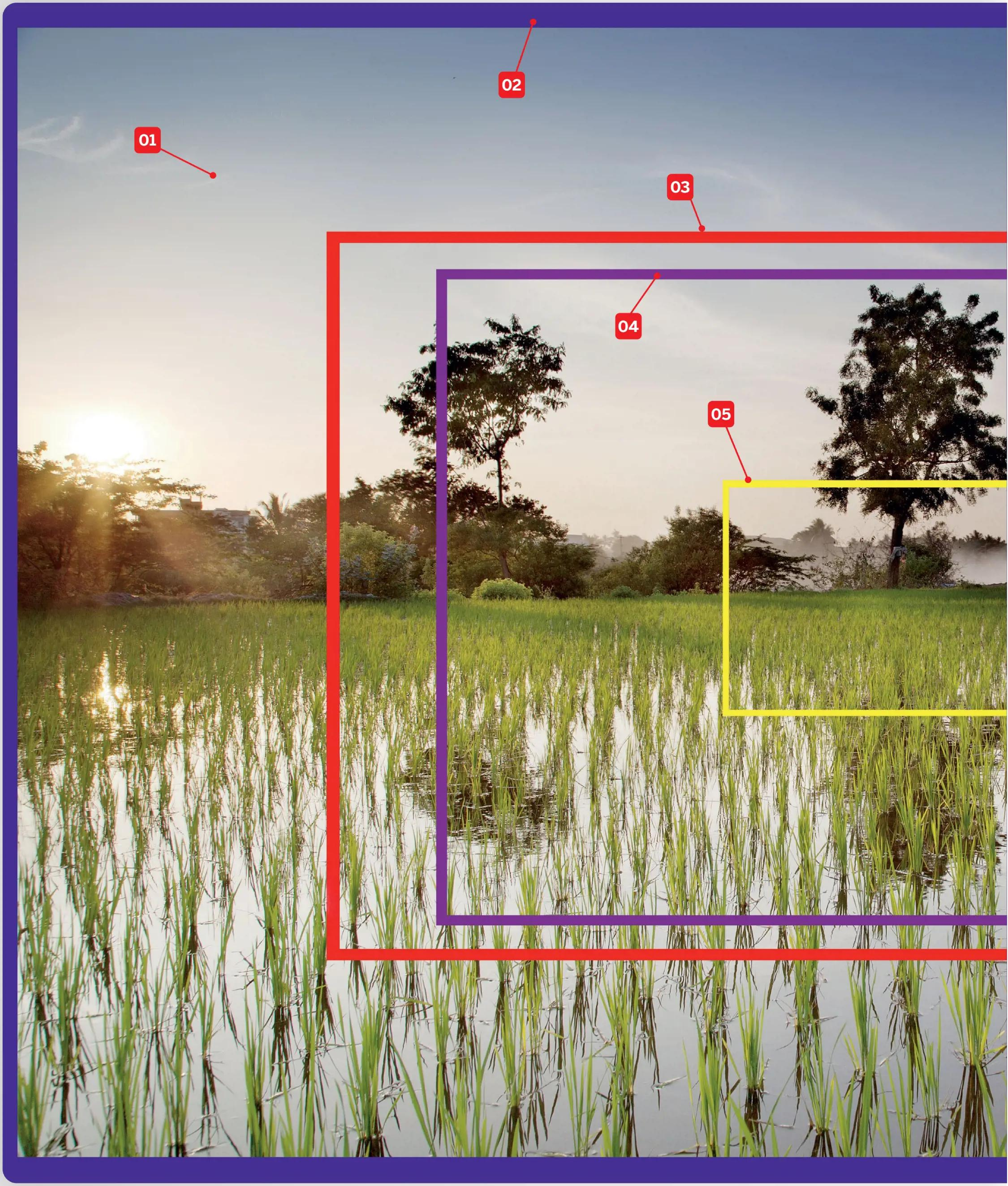
A full frame sensor measures 36x24mm in size. A full-frame sensor may have the same resolution (measured in megapixels) as an APS-C sensor, but the image quality will be higher on the full frame. This is because the surface area of the sensor is larger so it can capture more detail as the light hits it.

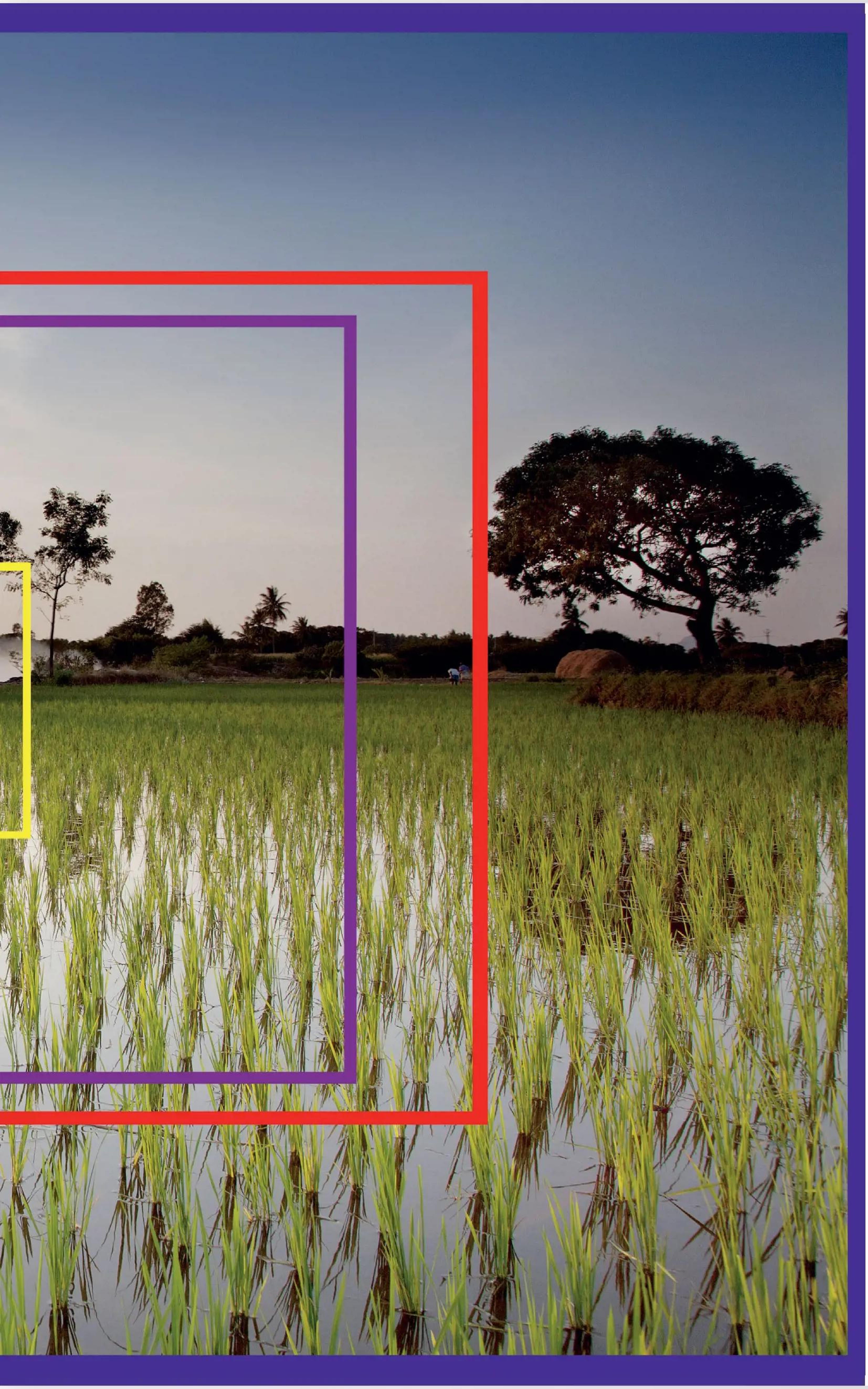
APS-C sensor

The crop-factor sensor on the Canon EOS 7D measures 22.3mmx14.9mm, significantly smaller than a full-frame sensor. When using an EF-S lens, it's important to note that the lens is designed for this type of sensor.

EOS M

The compact Canon EOS M also has a 22.3mmx14.9mm sensor. Unfortunately, this model won't fit the regular EF and EF-S lenses without an adaptor mount. Canon also has a range of EF-M lenses for this model.





01 THE BIGGER PICTURE

To give you a better idea of the different type of results you'll get with each sensor, here's an example of an image taken on a full-frame camera, with inset rectangles that show how the smaller camera sensors compare with the full-frame image.

02 FULL FRAME

The blue frame is the boundary of the full-frame sensor image. It was taken with a full-frame Canon EOS 5D MK II with a 24-105mm lens. We can see a wide view of the idyllic scene, and the image quality is high.

03 APS-C SENSOR

The red border is the area of the APS-C sensor. This sensor measures 22.3mmx14.9mm compared to the full-frame 36x24mm. The focal length of the image was shot at 28mm on the full-frame camera, so the red APS-C area shows an equivalent focal length of 44mm.

04 MICRO FOUR THIRDS

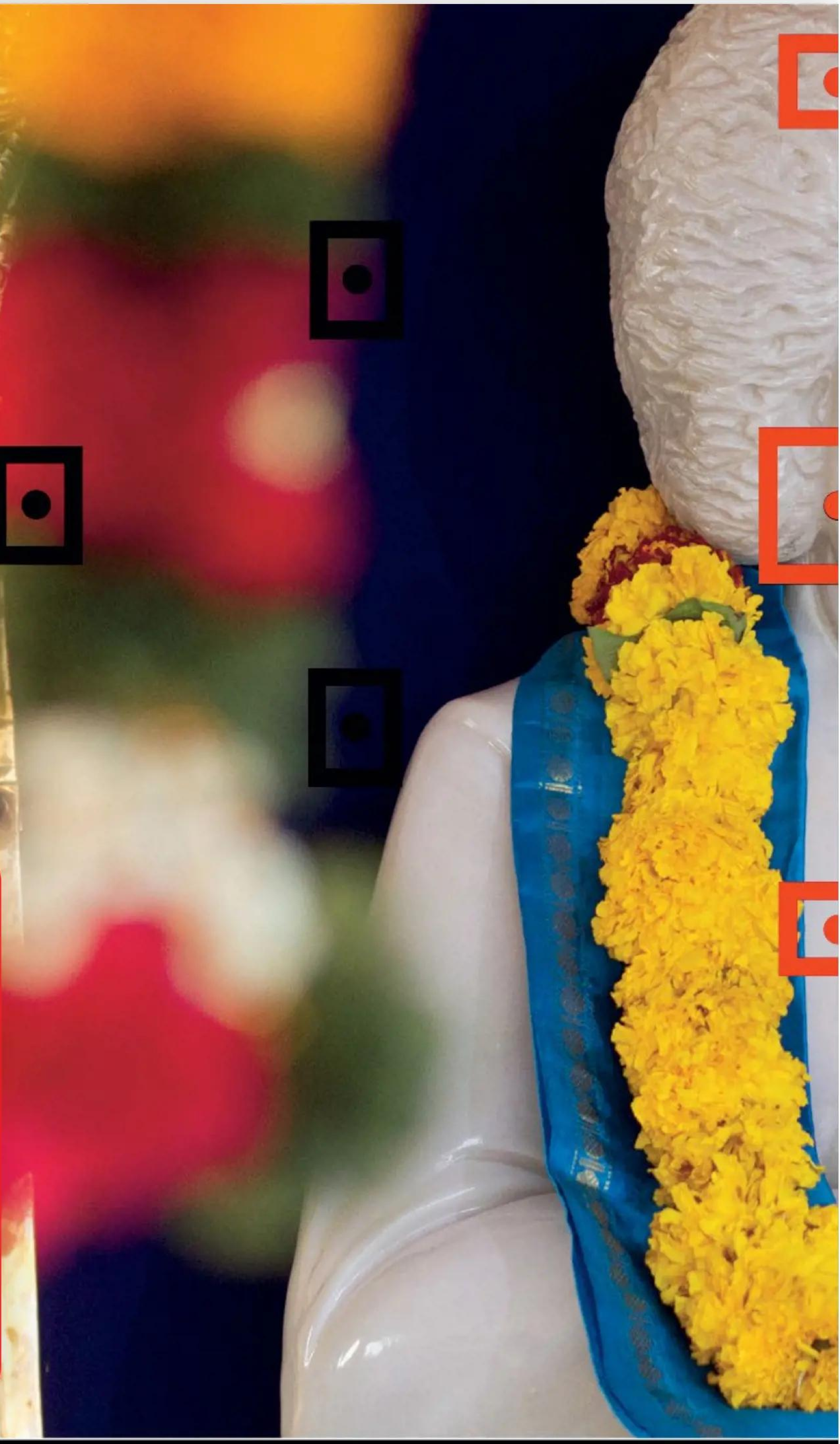
To give you an idea of how the full-frame and APS-C sensor compares with a Micro Four Thirds camera sensor, the purple area marks the edges. Compared with the full-frame area it's significantly smaller.

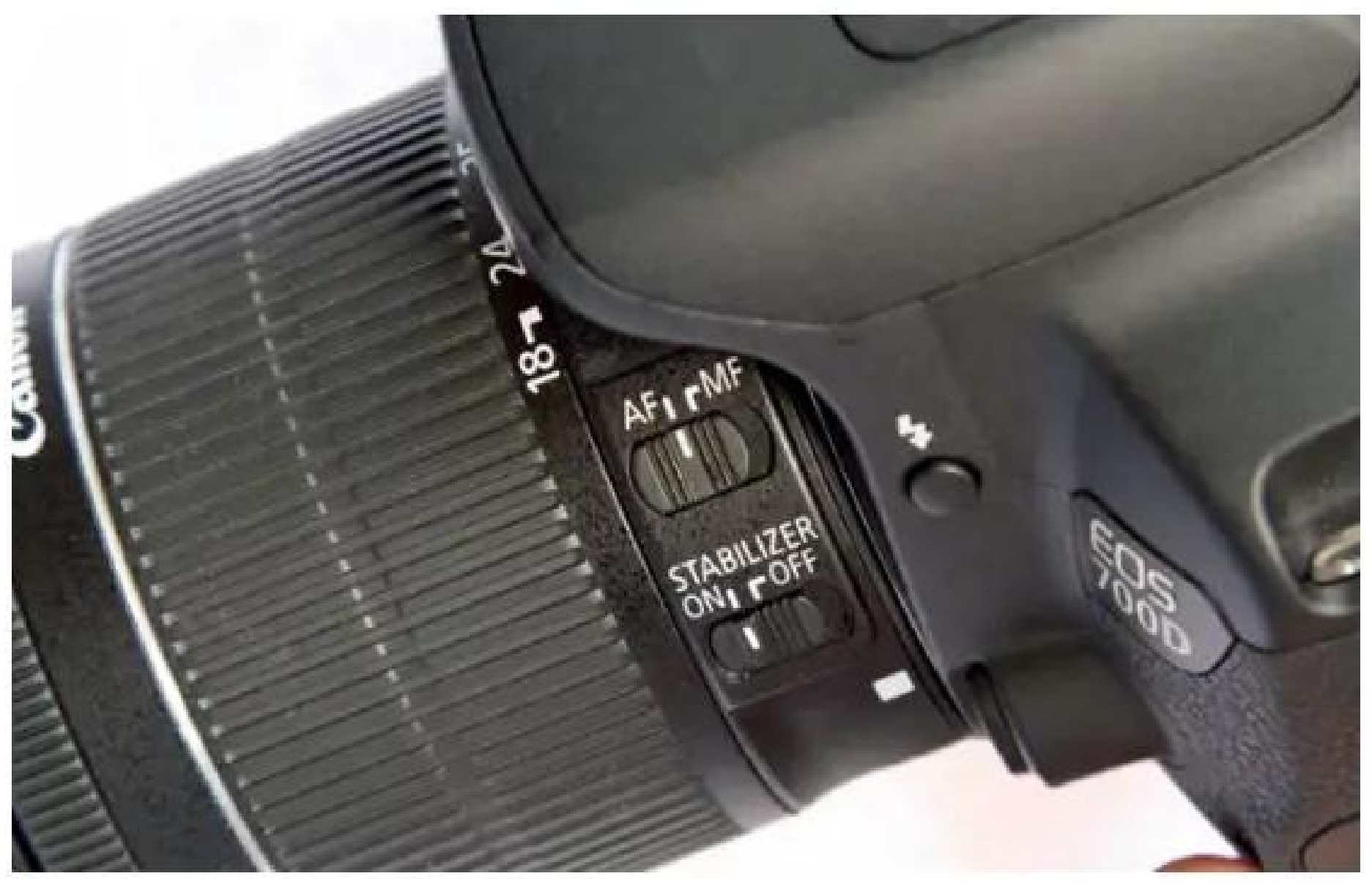
05 COMPACT CAMERA

Many compact cameras come with very small camera sensors. This is part of the reason they can't capture the same quality results as DSLRs. The yellow area shows how big a typical compact camera sensor measures compared with a Micro Four Thirds camera and two DSLRs.

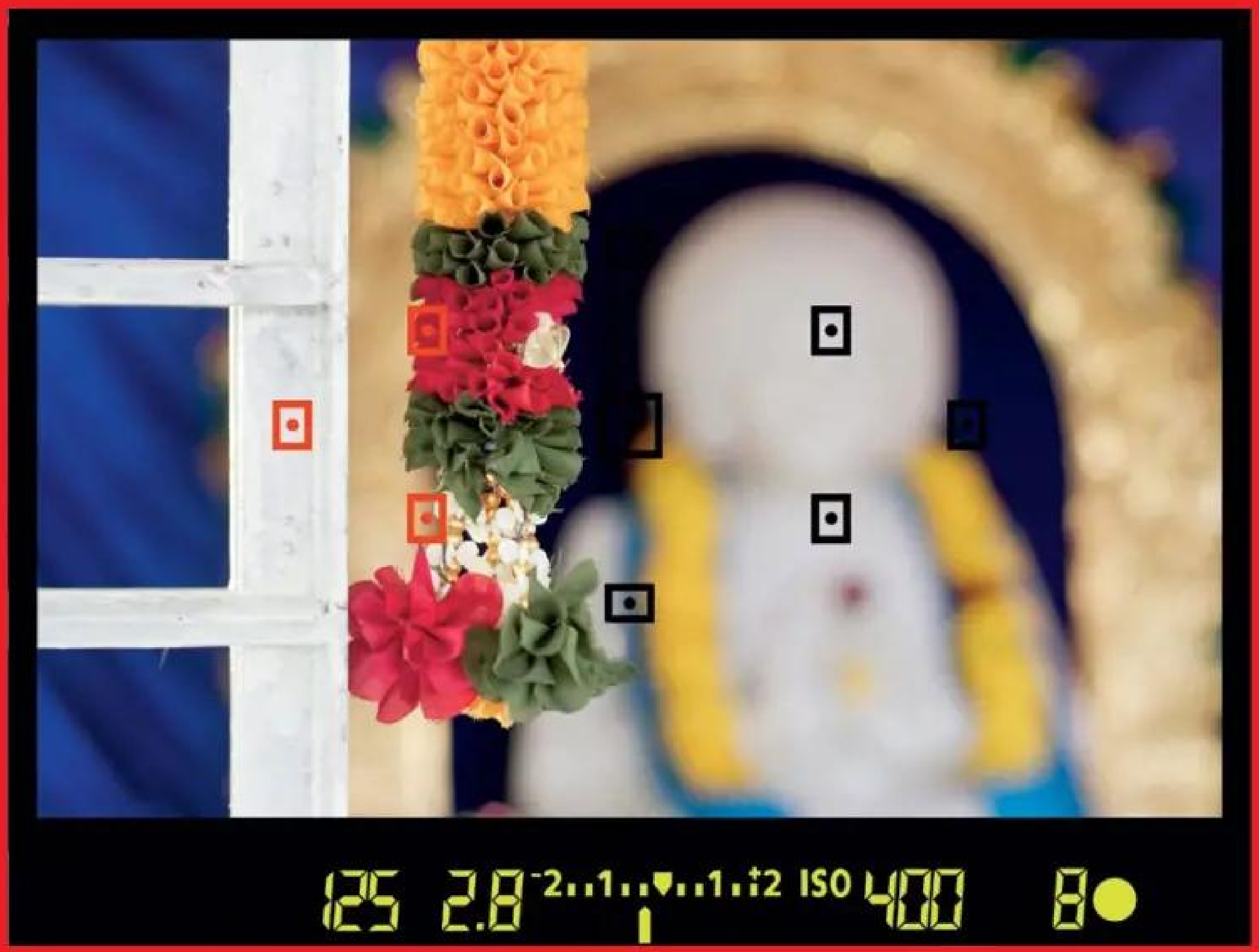
Autofocus

Let your camera take control of the focusing for you

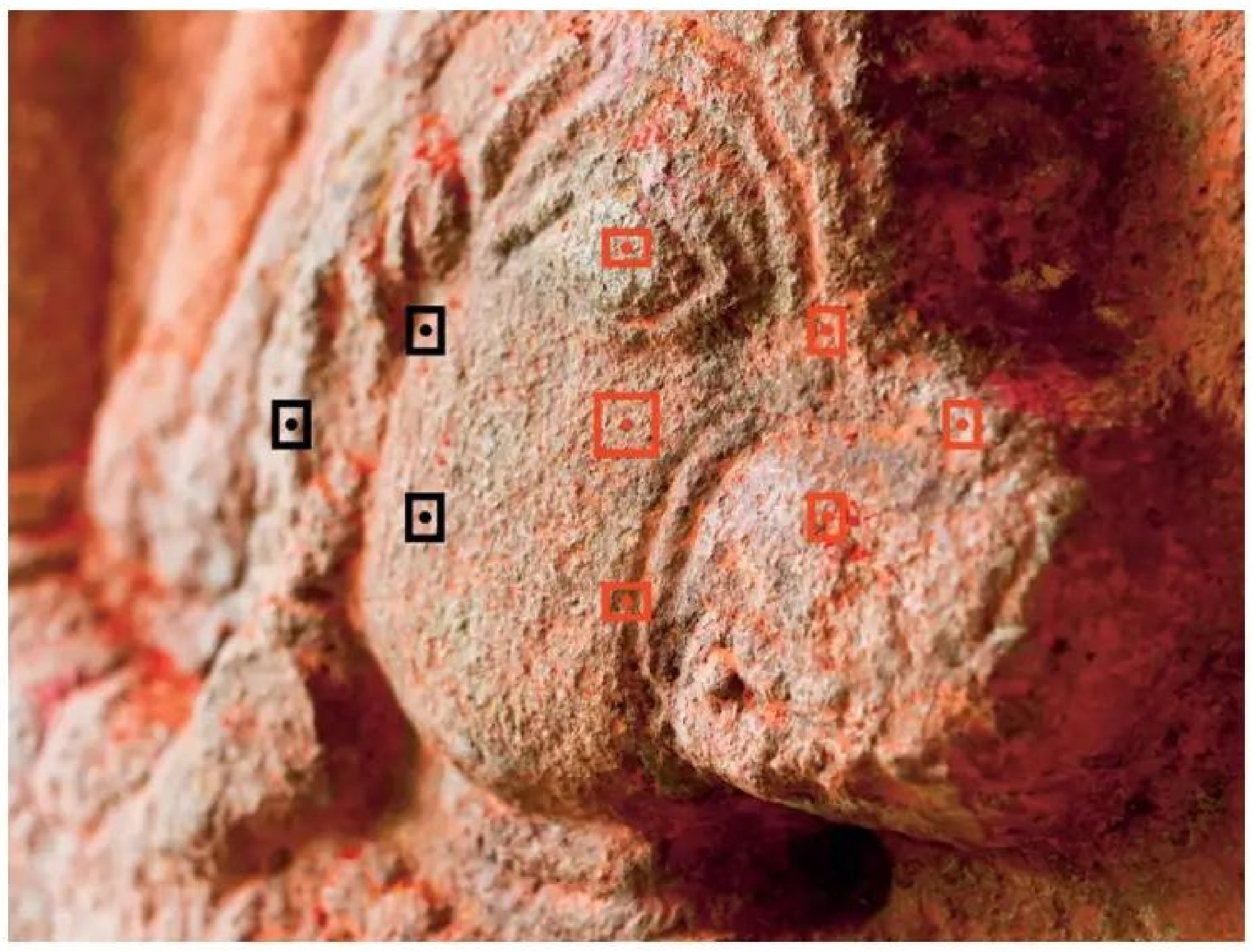



AF
MF
STABILIZER
ON
OFF
EOS 700D

Switch to autofocus
To use the autofocus you need to switch your lens to the AF setting. Once engaged, your camera will do all of the focusing for you.


125 2.8 -2..1..▼..1..:2 ISO 400 8●

Lock the focus
Look through the viewfinder and half press the shutter-release button. The point or points of the image that are in focus will highlight in red. Your camera will also make a beep sound.

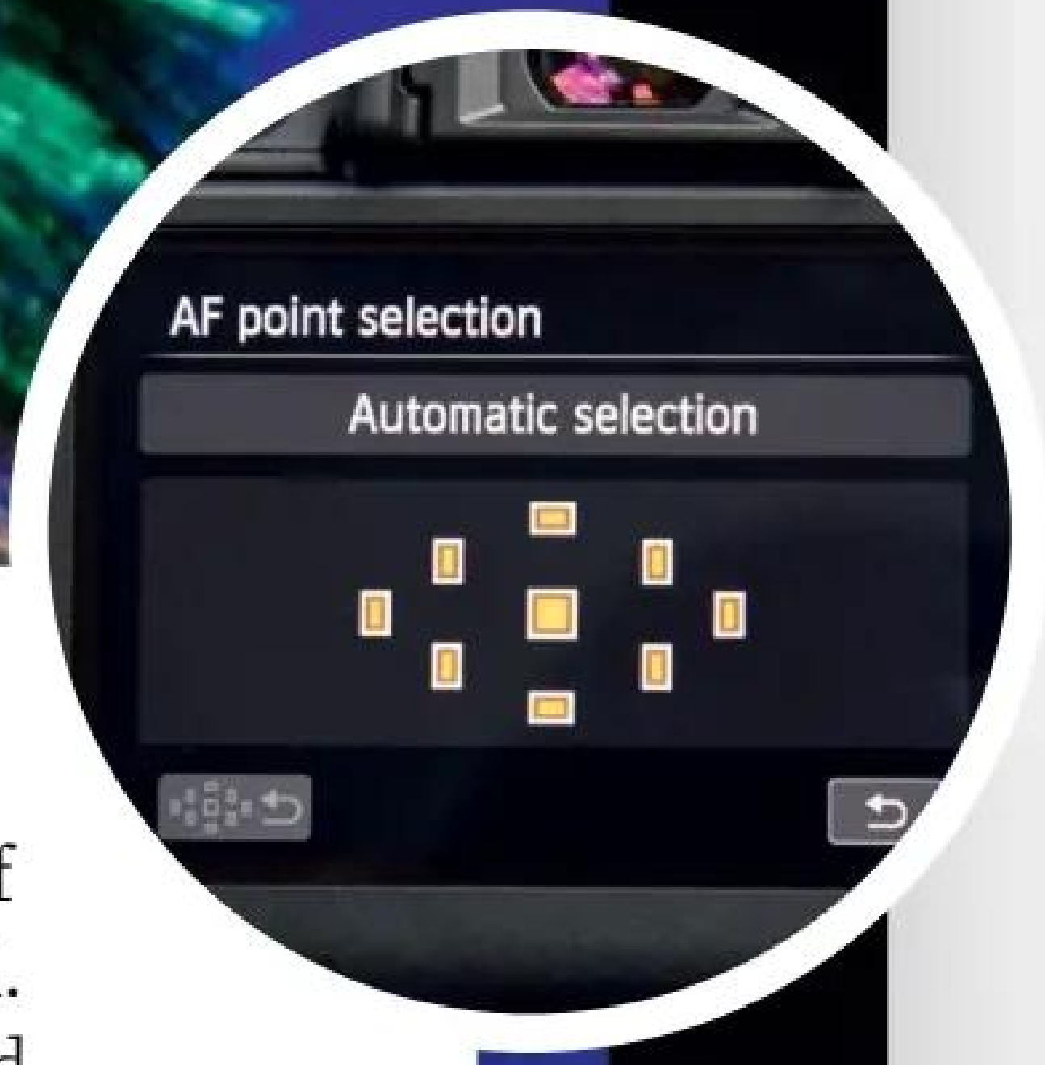


Limitations

Like the fully automatic exposure mode, autofocus is great for beginners, but it's limited by the fact that it might not always select the point you want it to. You should use it until you're ready to move on to the next level.

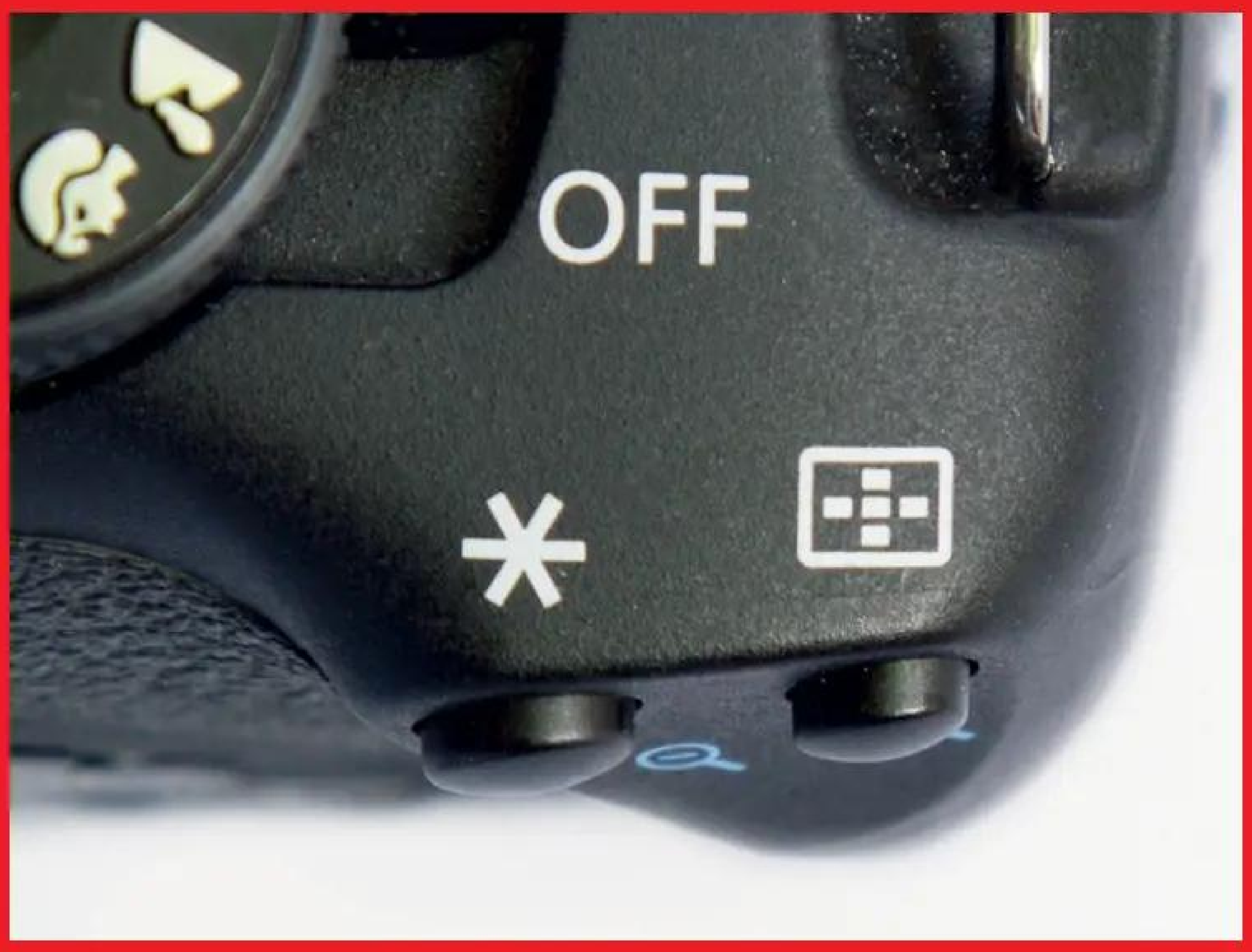
The focus grid

Your camera's focusing system is made of a grid of points. How many depends on your camera model. Canon DSLRs in the pro range have a 61-point grid. This means there are 61 points on the screen to choose from. Many of the beginner models have a 9-point grid, like the example here. To access the full autofocus selection, press the grid button. By default your camera should already be on this setting. If it's not, use the command dial until



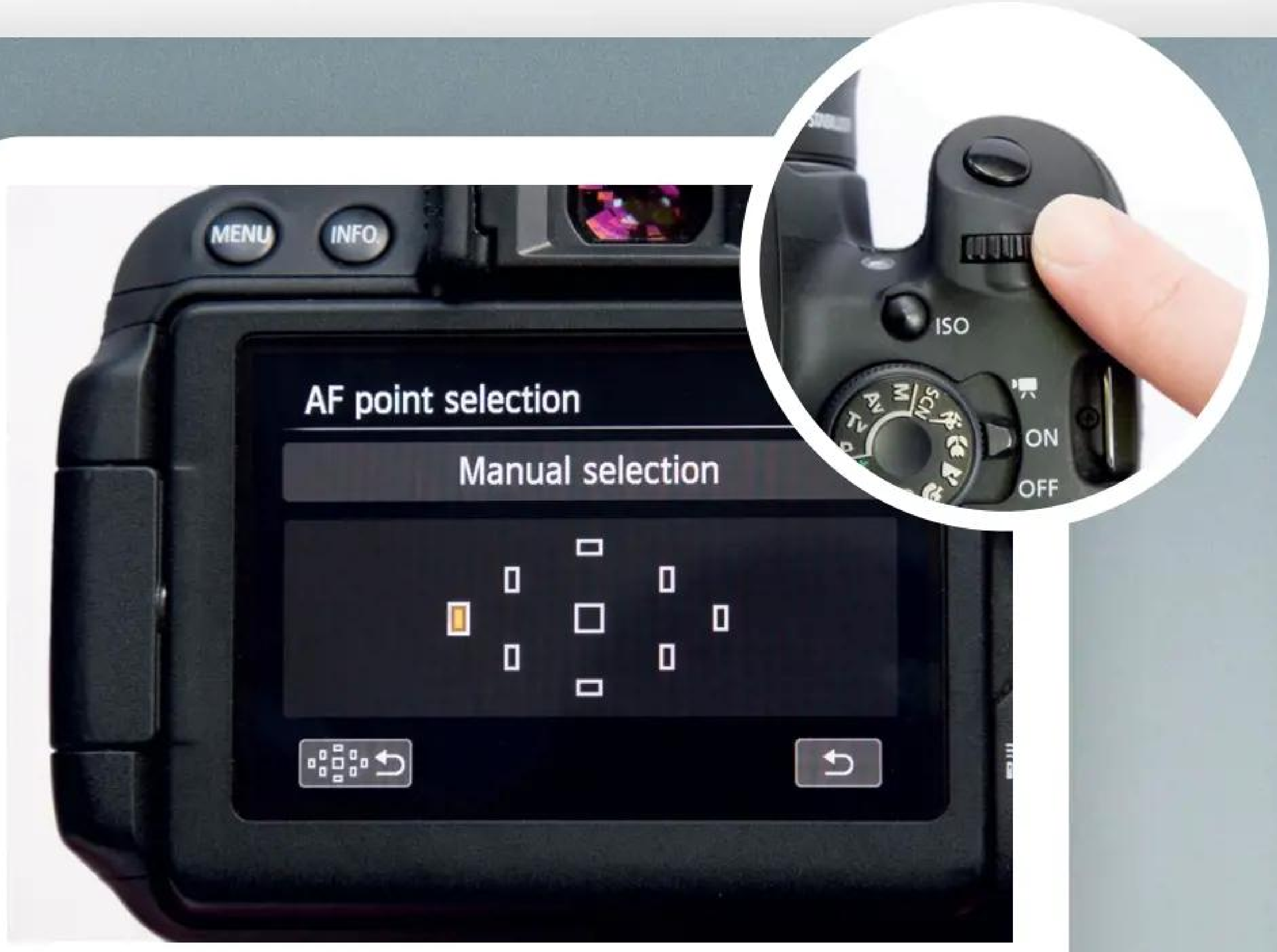
Select the focus point manually

Choose the exact part of the scene that you want to be in sharp focus



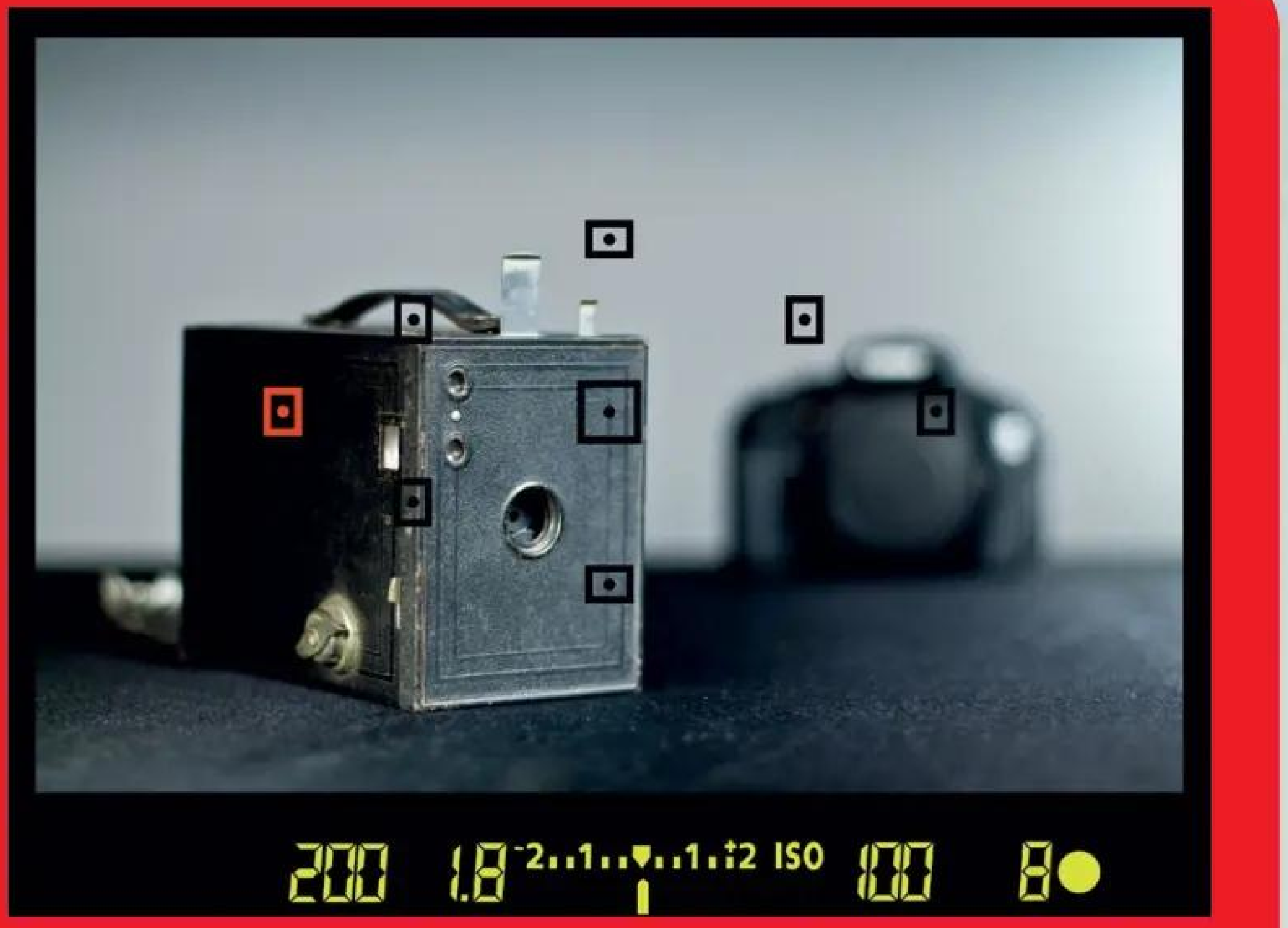
Switch to manual points

Letting your DSLR select the focus point for you won’t always guarantee the best results, so the first step in taking more control is to set the focus point manually. To bring up the menu option, press the grid button in the top right-hand corner of your DSLR. By default it will be set to the Automatic selection. To alter this you need to turn the command dial one stop. It will now be in the Manual selection screen.



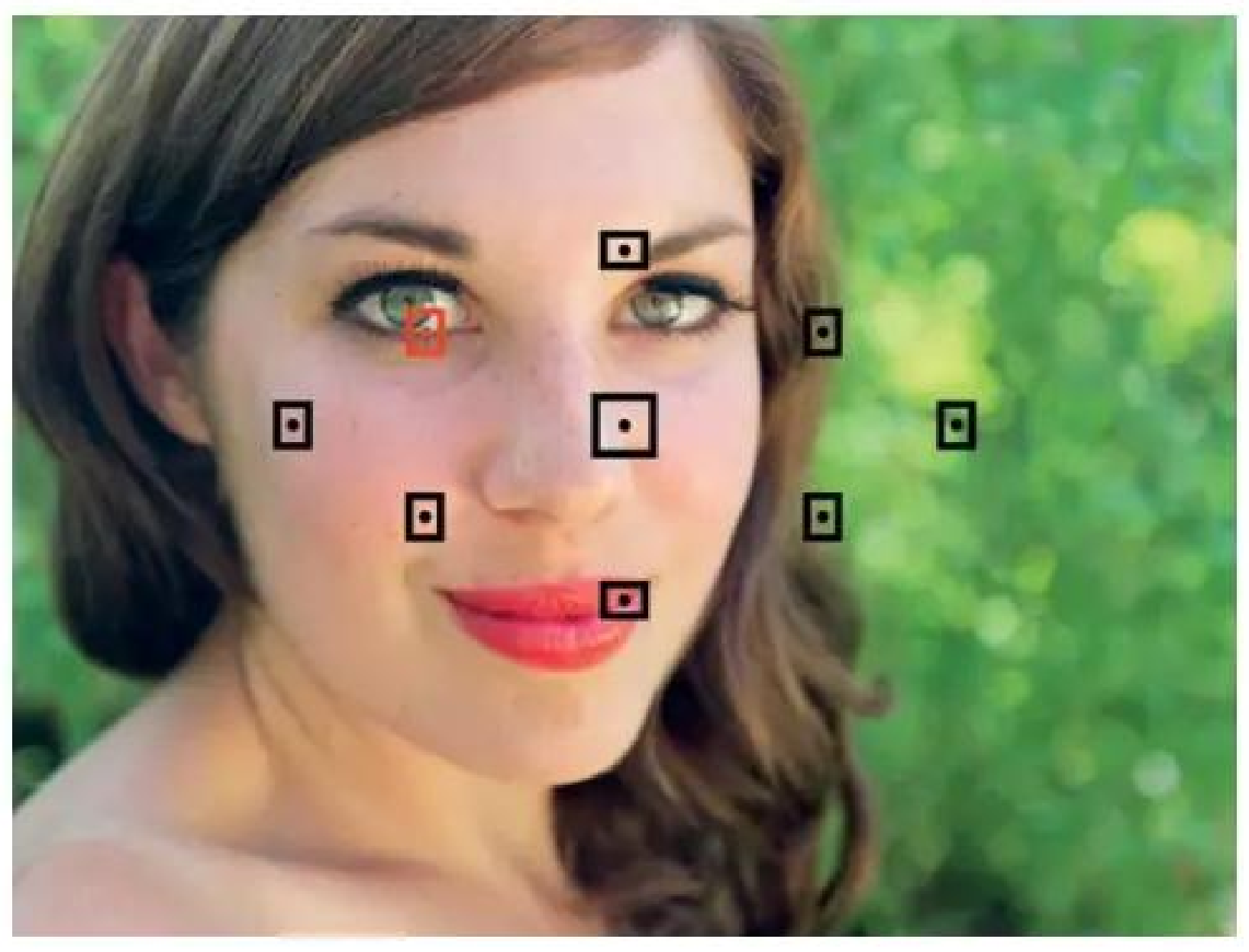
Select a point

Once you're in the Manual selection screen you can move the main focus point around the grid. You can do this in a couple of ways. First, if you keep turning the command dial it will move it around the grid and then back to the Automatic selection setting. Alternatively, you can use the back-panel multi-controller to switch between points.



Take control of autofocus

Here we've composed a shot of our subject so it sits on one side of the frame. We're happy with the composition of the image, but the focus isn't correct. Instead of keeping the subject sharp, it's selecting the background object. This is because the focus is on the Automatic selection. To correct this we need to set the AF point manually, to the left-hand side of the frame. If we look through the viewfinder this is how the screen will look when the focus button is half pressed. The main point is highlighted in red.



Shooting portraits

It's really important when you take a portrait that the eyes are sharp. For this reason we recommend you manually set the main focus point so that it sits over one eye, preferably the one that's closest to the camera, like in this example.

Choose the focus mode

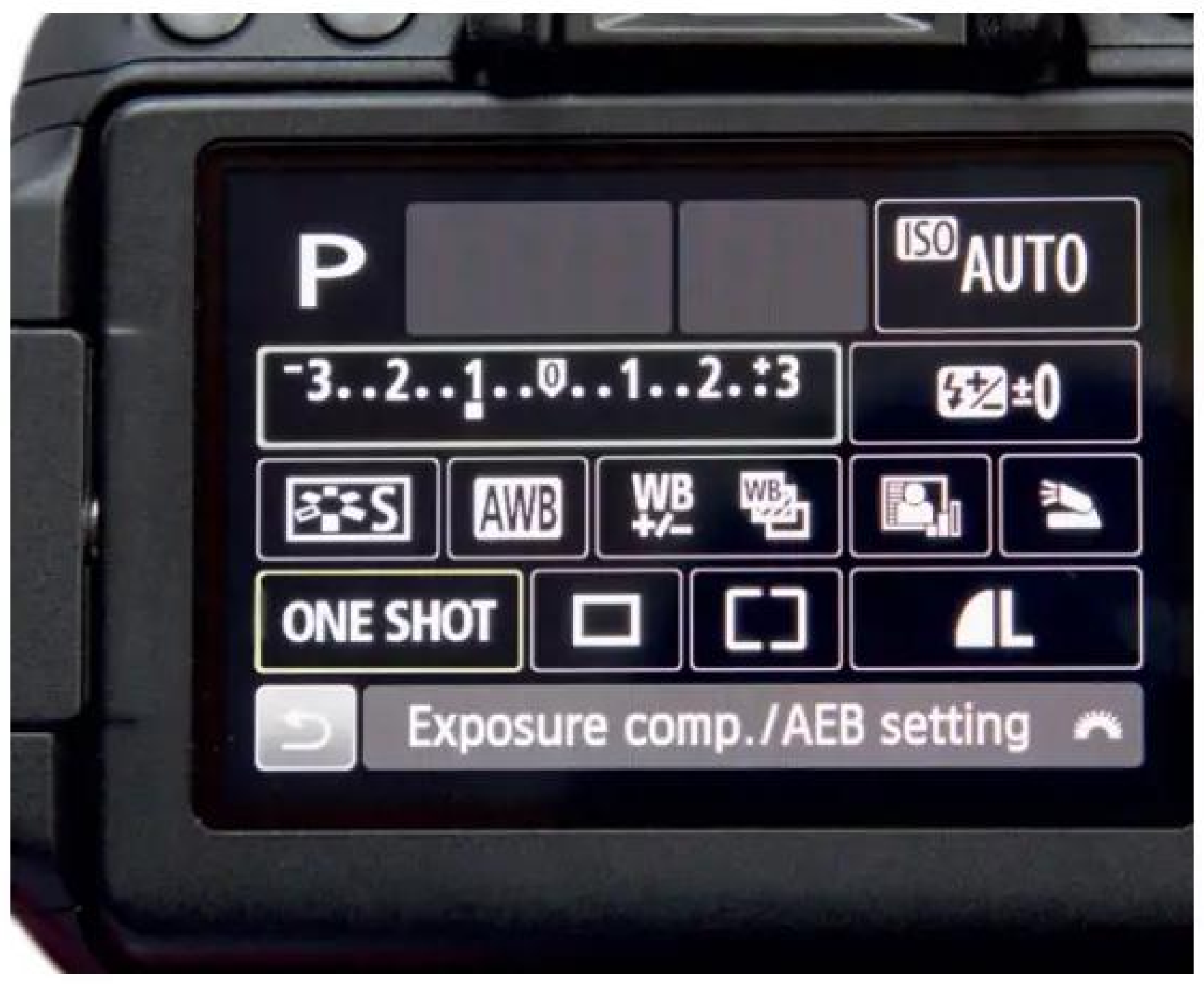
Learn how to select the correct focus mode to get the best possible results

Your Canon DSLR has three focus settings: One Shot, AI Servo and AI Focus. Each comes in handy for shooting alternative genres. For example, if you were trying to shoot a stunt bike in action, you'd need a different AF setting than if you were framing up a wide angled shot of a building.

Your Canon camera is able to track moving subjects with the AI Servo setting. Adjusting the settings at the right time will make the difference between taking noteworthy images or average snaps.
Turn the page to find out more...

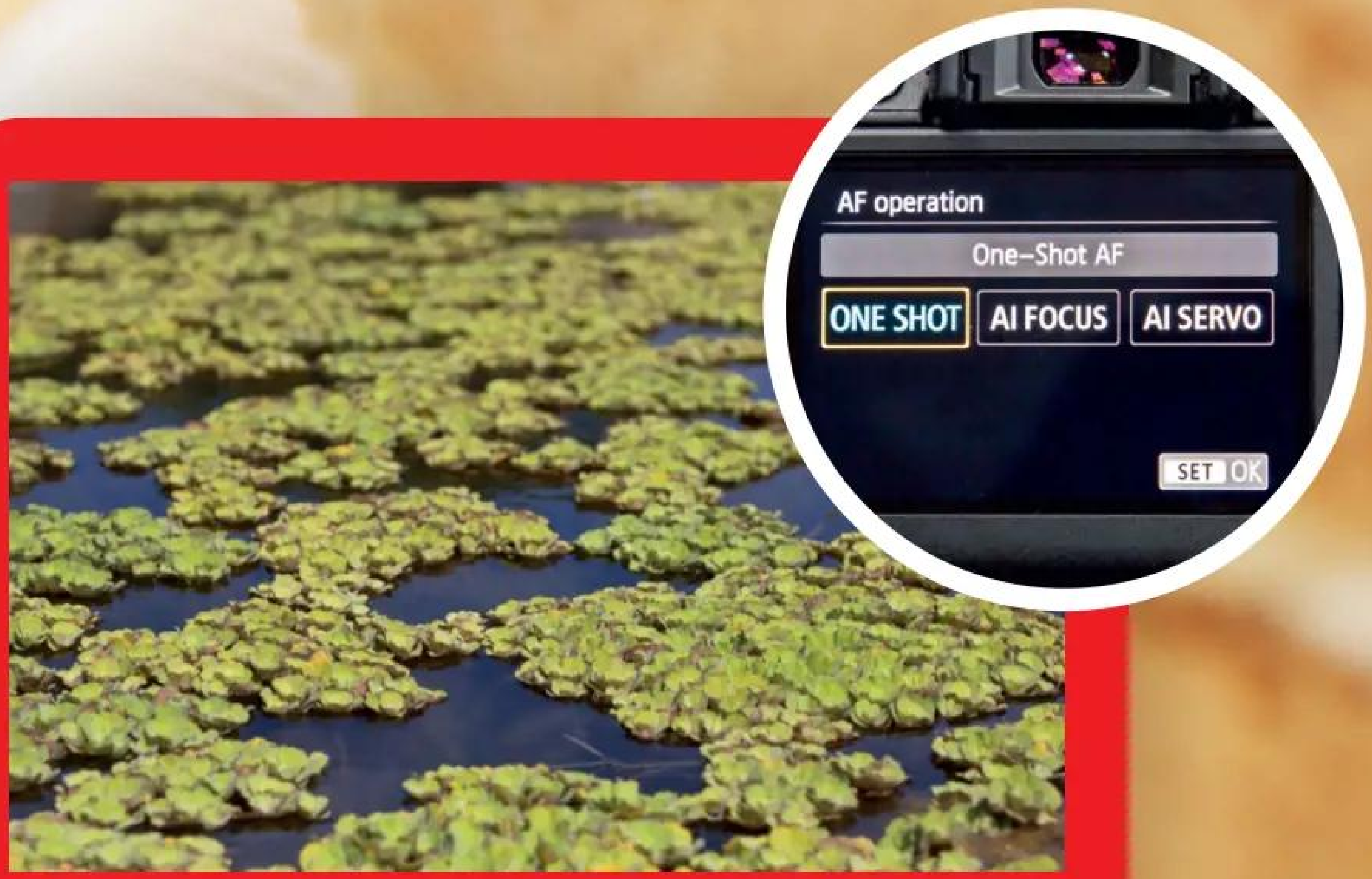
The focusing options available

Different shooting scenarios require different focus modes. Let's take a look at your options…


P
ISO AUTO
-3..2..1..0..1..2.:3
±0
AWB
ONE SHOT
L
Exposure comp./AEB setting

Access the settings

To access the autofocus settings press the AF button on the back panel, or press Q and bring up the menu on the LCD screen. On more advanced models such as the 7D, there's an assigned AF/Drive button on the top panel. To access, press and navigate through to the selected option.


AF operation
One-Shot AF
ONE SHOT
AI FOCUS
AI SERVO
SET OK

One shot

'One Shot' is best for shooting stationary subjects, such as still lifes, landscapes and architecture. Basically, if it doesn't move, put it into One Shot. Your focus points with this setting won't track any movement.

AF operation
AI Focus AF
ONE SHOT
AI FOCUS
AI SERVO
SET OK

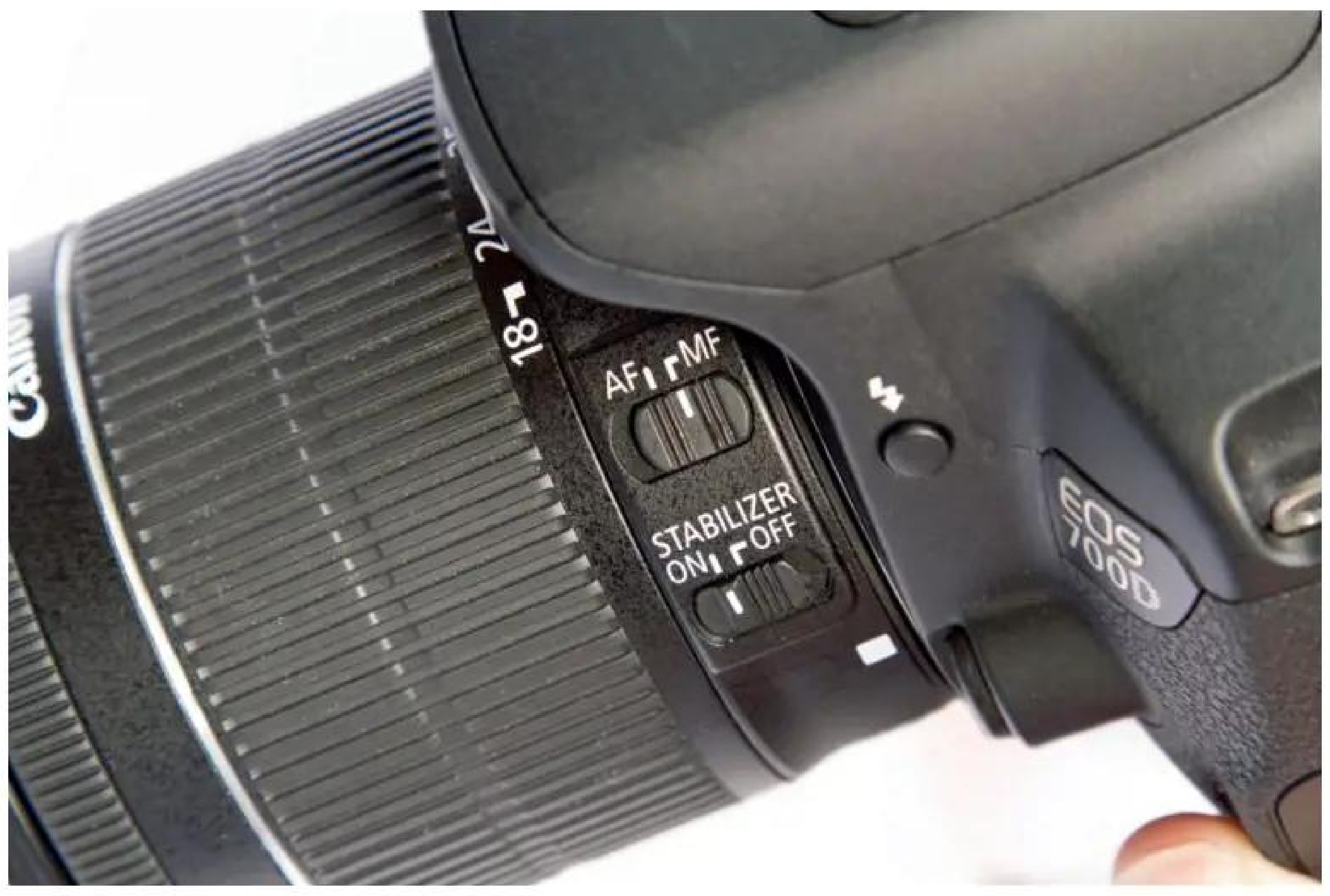
AI Focus

AI Focus is a mixture of AI Servo and One Shot. It's handy when shooting a mixture of static and moving subjects, such as at a wedding. In this mode the camera automatically switches between One Shot and AI Servo, depending on whether it detects movement in the scene.

AF operation
AI Servo AF
ONE SHOT
AI FOCUS
AI SERVO
SET OK

AI Servo

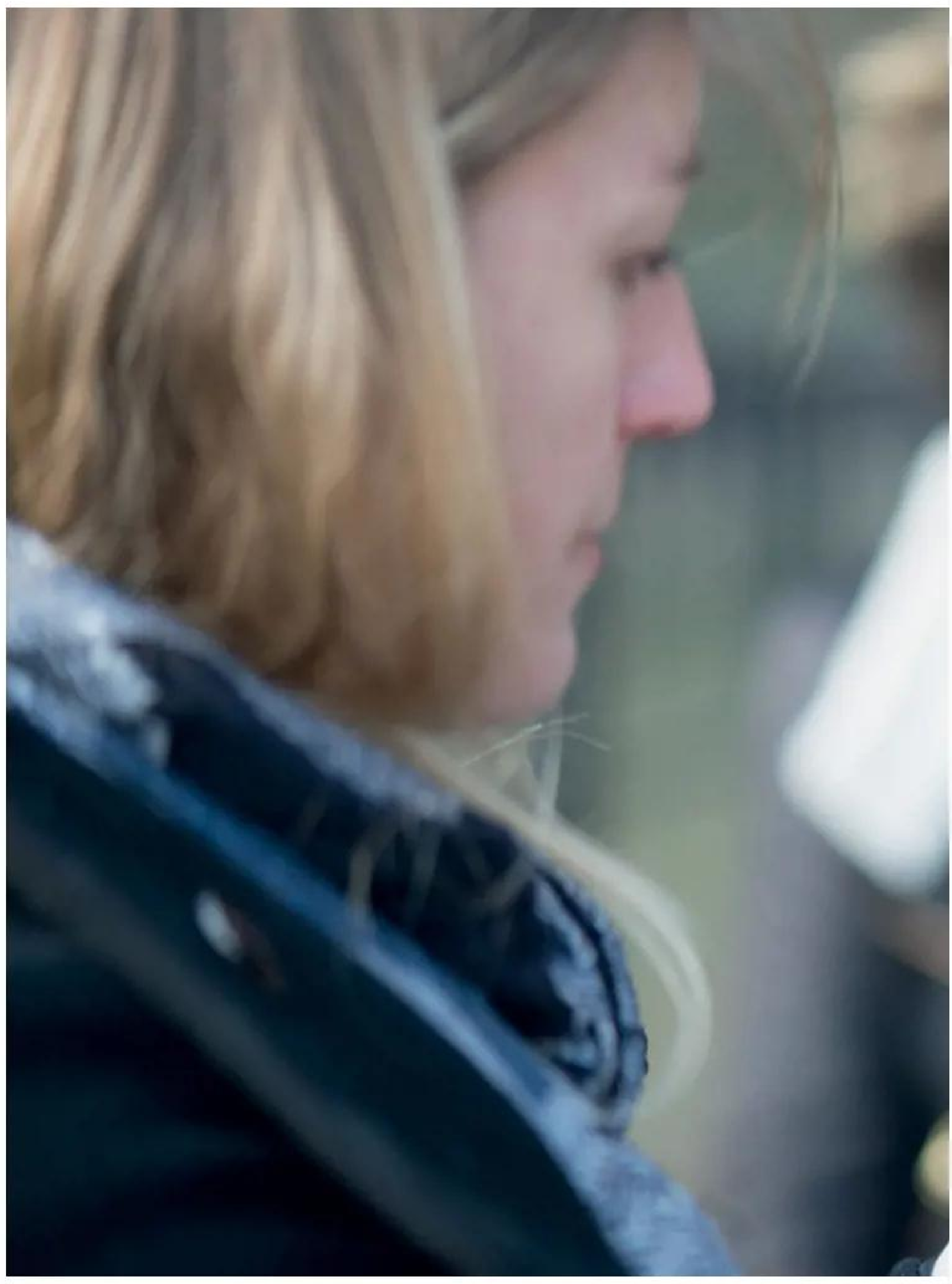
AI Servo is best used when shooting moving subjects. Its tracking technology means you'll get the best chance of keeping your subject sharp. So if it's on the go, AI Servo is the correct setting. You have the option to adjust the sensitivity of the AI Servo feature in the custom menu (only some models include this). Look for the Autofocus/Drive AI Servo tracking sensitivity menu setting.


Canon
18
AF MF
STABILIZER
ON OFF
EOS 700D

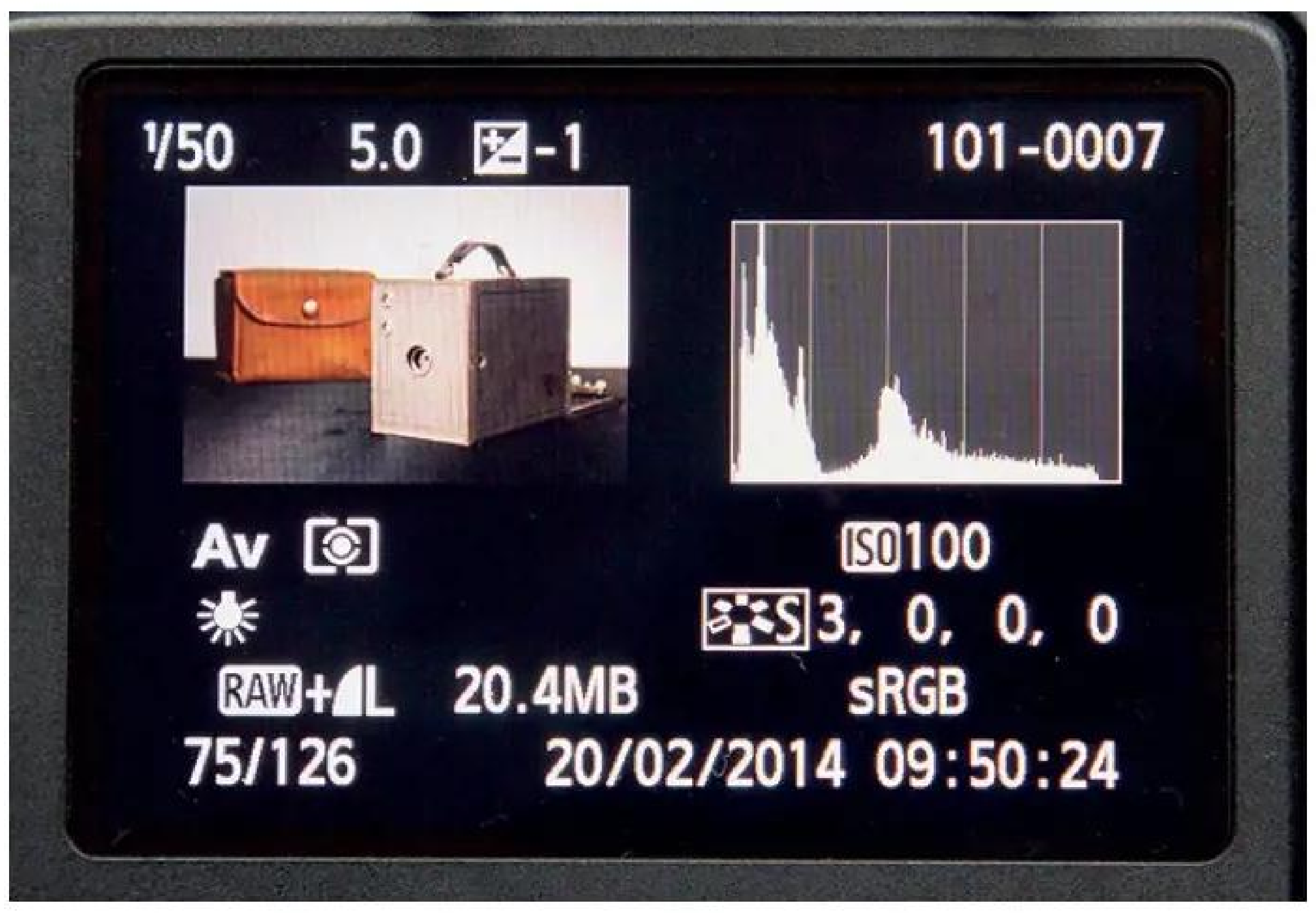
Manual focusing

Finally, it's worth mentioning the manual focus setting, marked MF on the lens. Switching off the autofocus can prove more accurate or faster in specific situations, such as in low light, when the autofocus is struggling to lock onto its target. It can also be useful if you want to blur the image on purpose.

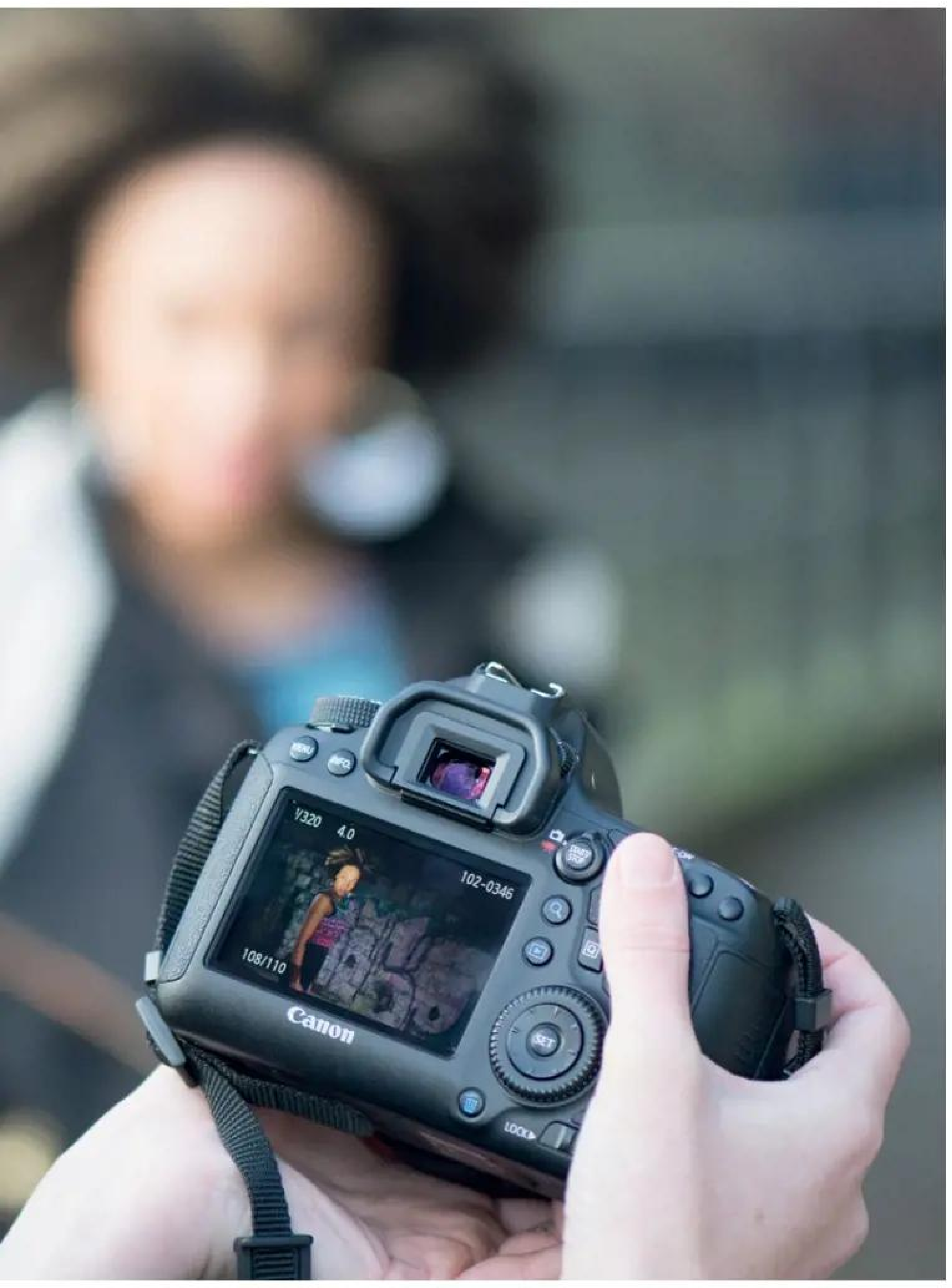
1/60 5.6 100-9635
7/22



AV
WB
SET
AF


1⁄50 5.0 -1 101-0007
Av
100
3, 0, 0, 0
RAW+L 20.4MB sRGB
75/126 20/02/2014 09:50:24

MENU
INFO
Protect images
Rotate image
Erase images
Print order
Photobook Set-up
Creative filters
Resize
Av
WB
SET



Live View and Image Review

Use your DSLR's Live View and Image Review features to check your shots before and after you take them

76 Introducing Live View mode

We reveal all the dos and don'ts of using Live View to get the most from the feature

78 Live View mode in action

Discover when it's better to use Live View mode rather than the viewfinder

80 Shoot and review your images

See the results of your captures instantly by hitting the playback button

84 Check the sharpness of your images

Zoom right into the image on the back-panel LCD to check the sharpness of the main focal point in your photos while on location

86 Check exposure using the histogram

Use the in-camera histogram and highlight warnings to check the exposure of an image

Live View mode

We reveal all the dos and don'ts of using Live View to get the most from the feature

Using the Live View feature to compose an image will work better in some shooting scenarios than others. In this lesson we're going to run through the dos and dont's of when to engage Live View and when it's best to avoid it.

To bring Live View into action you first need to press the button. This should be on the back panel of your camera. Once engaged you have the option to alter the display setup. Press the Info or Display button to do this.

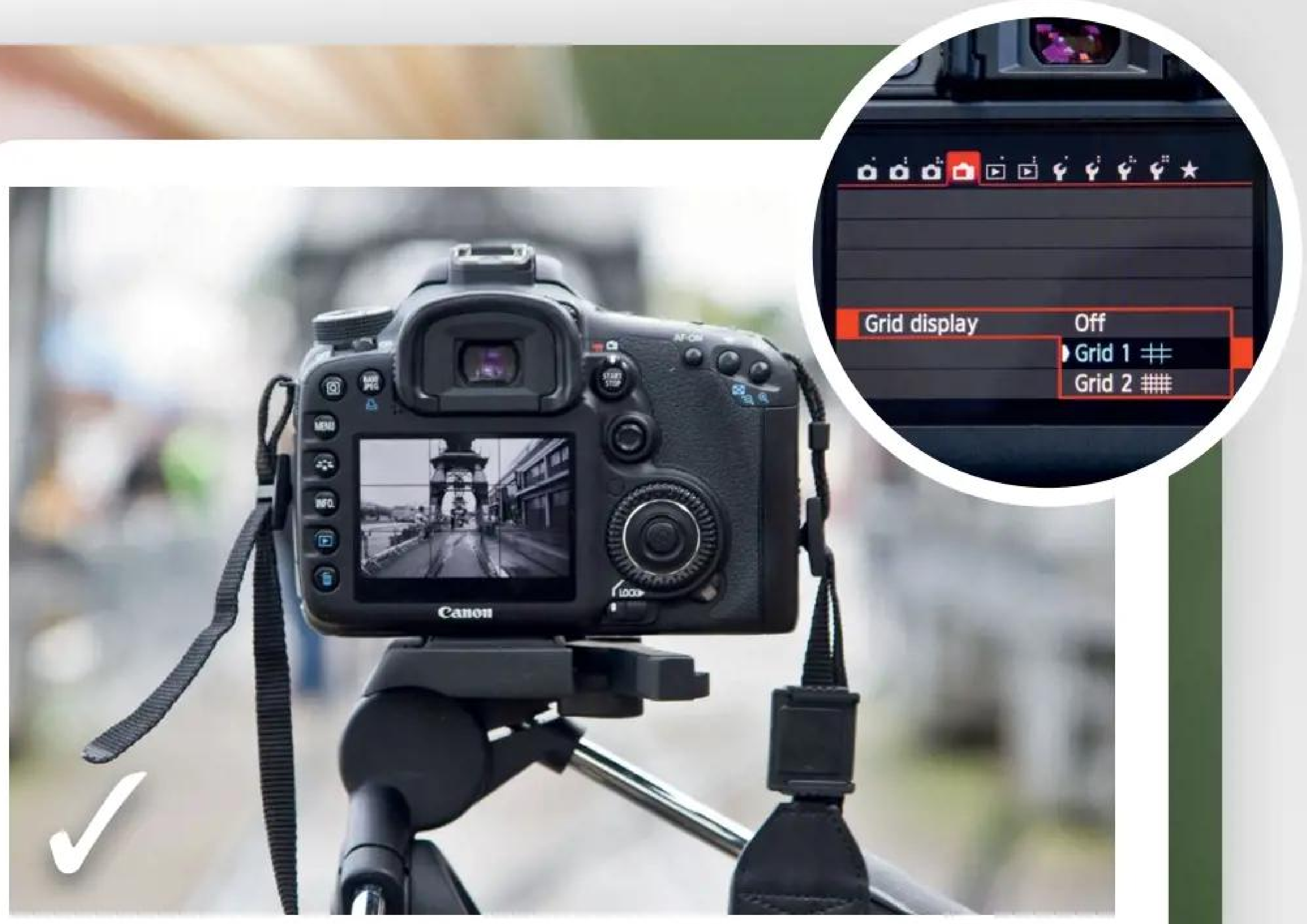
You also have option to adjust the Live View features in your camera's main menu. Under the red camera settings tab (last in the red section) you'll notice the icon looks slightly different (it shows the back of the camera). These are all of your options for the Live View feature.

DO shoot still lifes

Use Live View to shoot still-life scenes. You're not against the clock so we suggest you mount your camera on a tripod and use the feature to carefully compose your shot. If shooting by hand, however, we recommend you shoot using the optical viewfinder.

DON'T shoot action

Don't use Live View when photographing action. Due to the mechanical workings of Live View, the autofocus is considerably slower compared with shooting through the viewfinder. Therefore we recommend sticking to the viewfinder for high-speed shooting.



DO use the grid

Use Live View to help compose your image. There's an overlay grid feature that's useful when composing a scene. Head into the main menu and under the red camera setting section look for Grid Display and select from the options. This can be a great help when you're trying to compose your image using the rule of thirds or for when you're trying to keep the horizon straight. Many Canon DSLRs also come with an electronic level feature, which can be useful when shooting landscapes.

LCD brightness
1 2 3 4 5 6 7
SET OK
✓

DO capture video

Use Live View to shoot video. Actually, you have no other option because the camera automatically engages the feature, therefore blocking the viewfinder from use. It can be tricky in bright light to see the screen, so head into the camera's main setup menu to adjust the LCD screen's brightness.

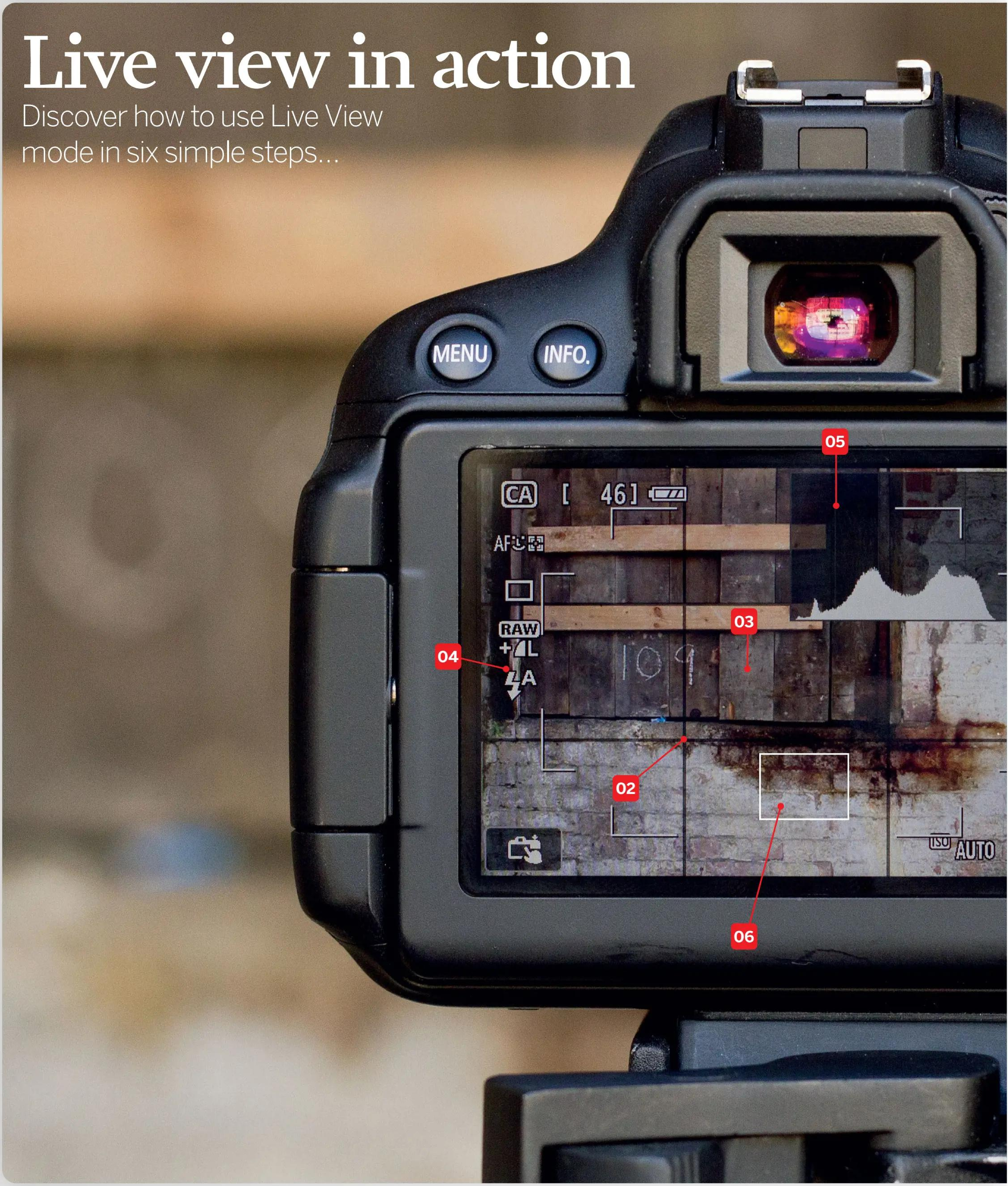
AF•DRIVE ISO•
50 4.5
ISO 160
ONE SHOT
AF-ON

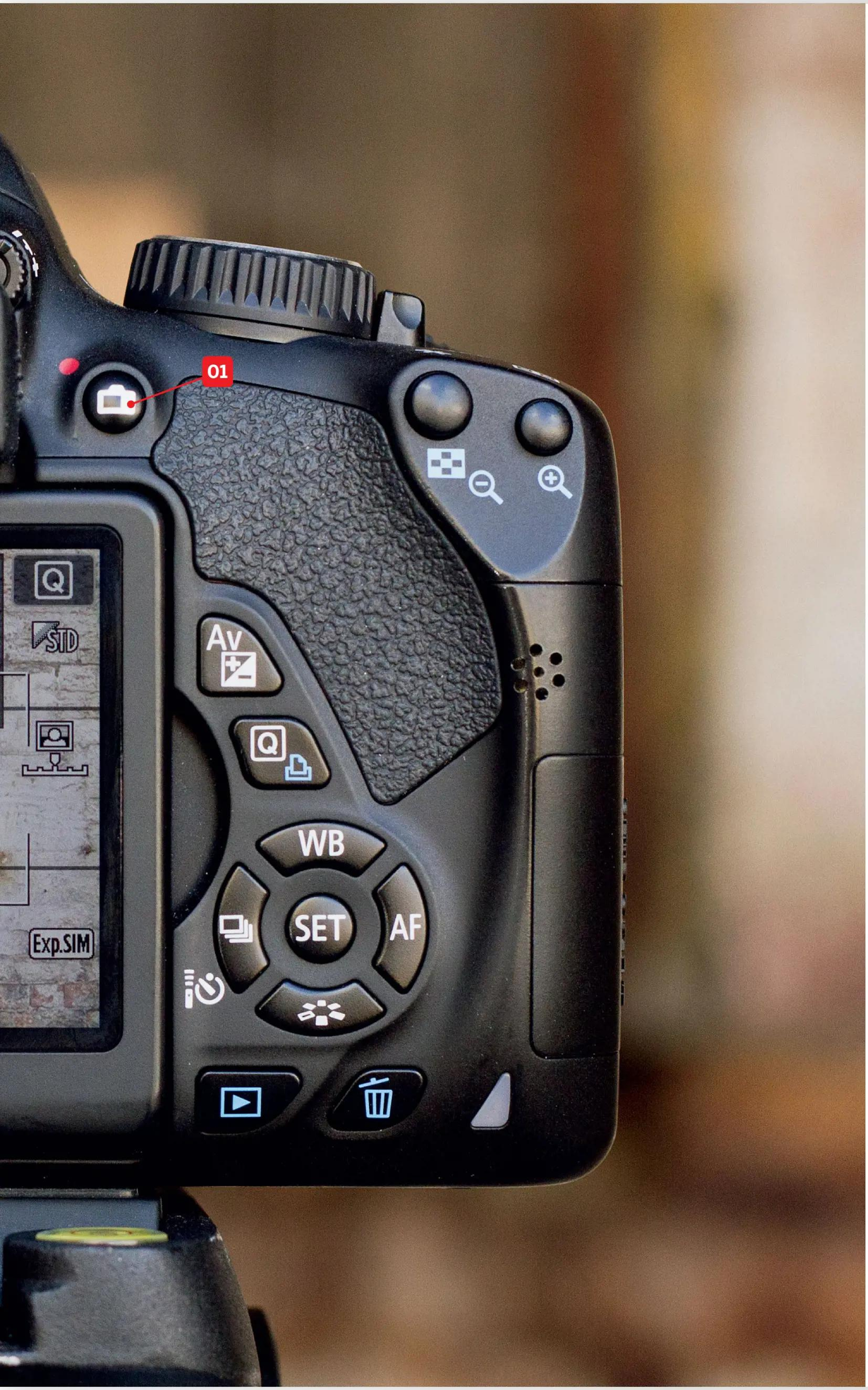
DON'T drain the battery

Don't use Live View when your battery is low. The feature will drain your camera's battery much quicker, so keep this in mind. If you plan on using the feature a lot on a shoot, bring along a spare.

Live view in action

Discover how to use Live View mode in six simple steps…


MENU
INFO.
CA
461
AF
RAW
A
ISO AUTO
05
03
04
02
06



01 ENGAGE LIVE VIEW

Press the Live View button on the back panel to engage the feature. You'll hear your camera click. This is the mirror inside the camera flipping up out of the way of the sensor, making the optical viewfinder temporarily unusable.

02 COMPOSE THE IMAGE

You'll find it much easier to compose your image if you engage the grid line feature. Head into the main camera menu to select it. Most photographers use the thirds grid because it can help when composing a shot.

03 MAIN IMAGE

On the screen we can see live what's in front of the camera's lens. The image on the screen will adjust with the ambient light settings, so we can see what's going on. When we adjust camera settings it will also show on the screen, letting us see what the end result will look like.

04 CAMERA SETTINGS

To alter the setup in Live View we need to press the Info or Display button. The main camera settings can be found at the bottom of the screen. On the side you'll find some other useful settings such as the white balance and image quality controls.

05 CHECK THE HISTOGRAM

The histogram is a useful tool that enables you to check the exposure of the image. See our guide to the histogram on page 90 to find out how to read one. Don't worry – it's not as complicated as you may think!

06 FOCUS BOX

The beauty of Live View is that you can move the focus point around anywhere on the screen. Simply use the back-panel controller to do this. It's focused when the square turns green. Some of the later DSLRs, such as this 650D, come with an advanced touch shutter and AF feature. You simply press the LCD screen to focus and fire the shutter.

Shoot & review

See the results instantly by hitting the playback button

Being able to shoot and review is the beauty of digital technology. Seeing what you've just captured straight away is one of the massive benefits of using a digital camera. Like many features on your Canon DSLR, there's more to this playback option than simply being able to look at your images on the screen. You also have the option to do a bunch of other things such as protecting your images and rotating them. There's even an option to watch them in a slide show display. Turn the page to find out more… ▶

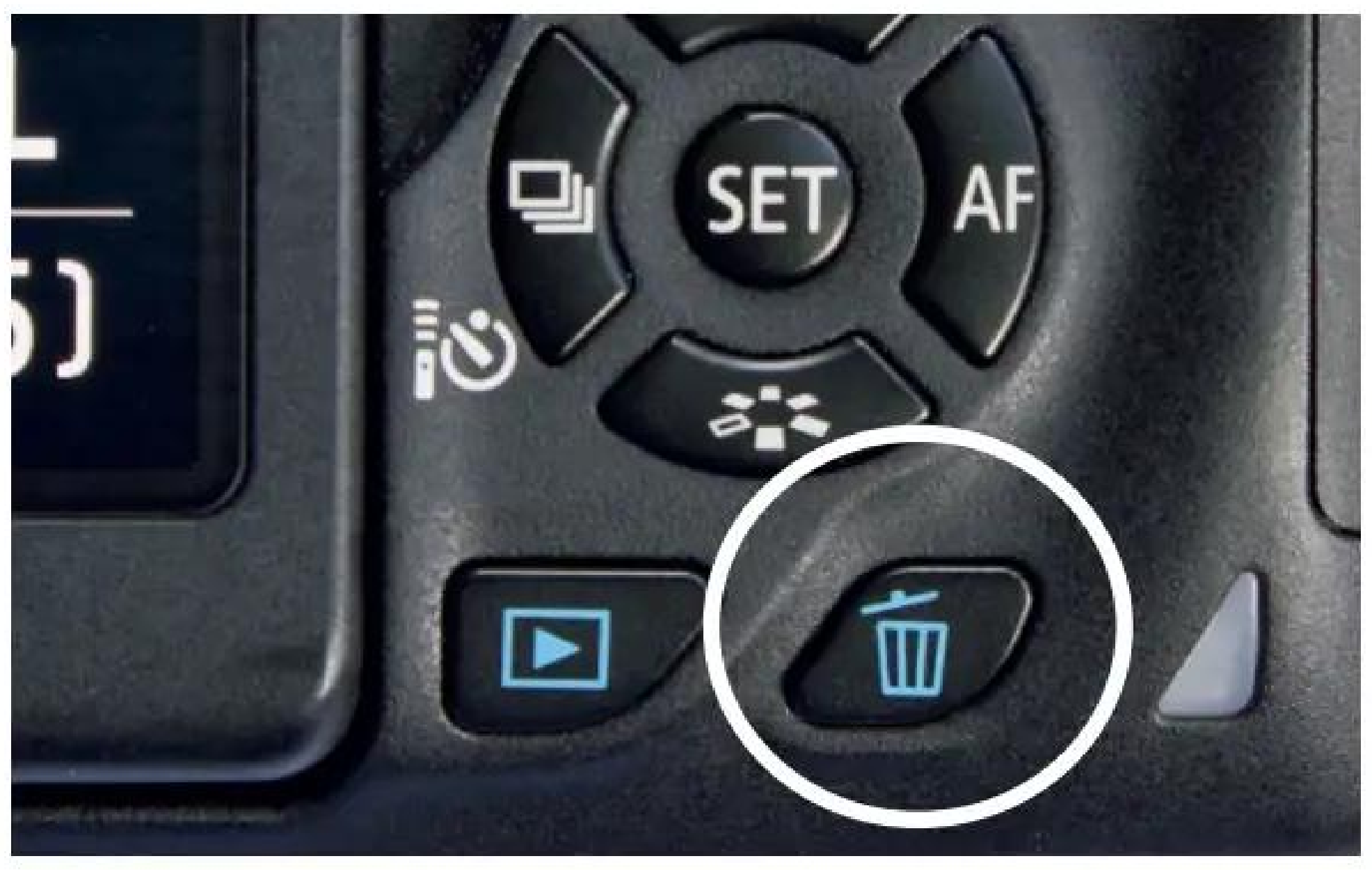
FREE ON FILESILO

When you see this graphic there's a video on FileSilo

See page 194 for more

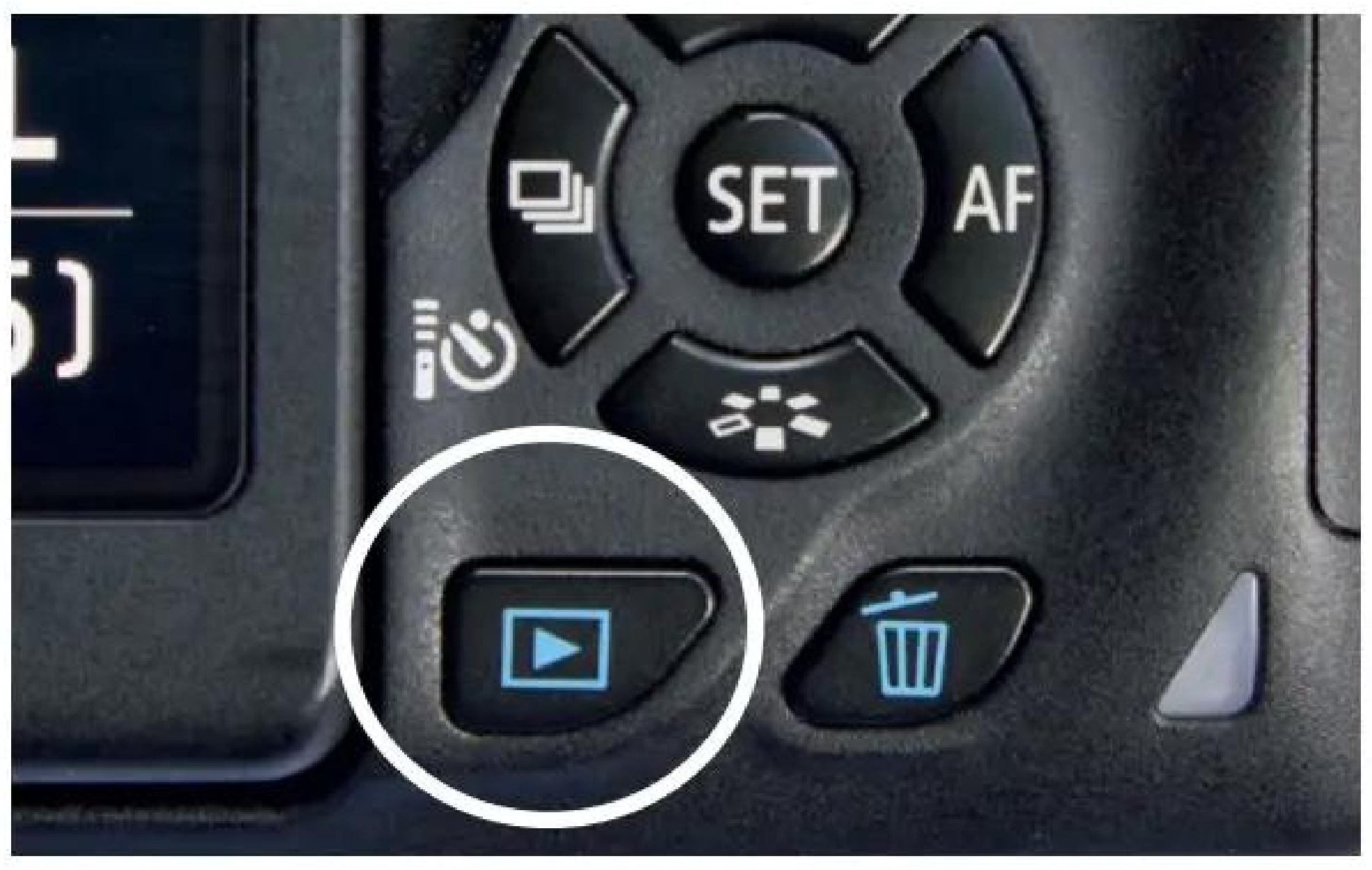
Press play to review

Use the LCD screen to quickly assess your recent shots



Deleting an image

You have the option to delete images as you review them. There's a rubbish bin button on the back panel for this job. When pressed, a warning message will appear. To complete the task, highlight the Erase option and press Set. You can also delete multiple images by accessing the Erase images option in the Playback menu. Be careful not to go overboard when it comes to deleting images, however, because you'll get a much more accurate result when looking at your images on a computer screen.



Playing images back

To review the images on the memory card, press the play button. Now you can alter the layout of the screen by pressing the Info or Display button. You can decide whether you want the screen to share no technical information, to show camera settings, or to see the histogram. (We'll cover this later on.) To flick through your images, use the back-panel multi-controller to navigate left or right.

1⁄320 4.0
102-0346
108/110
Canon

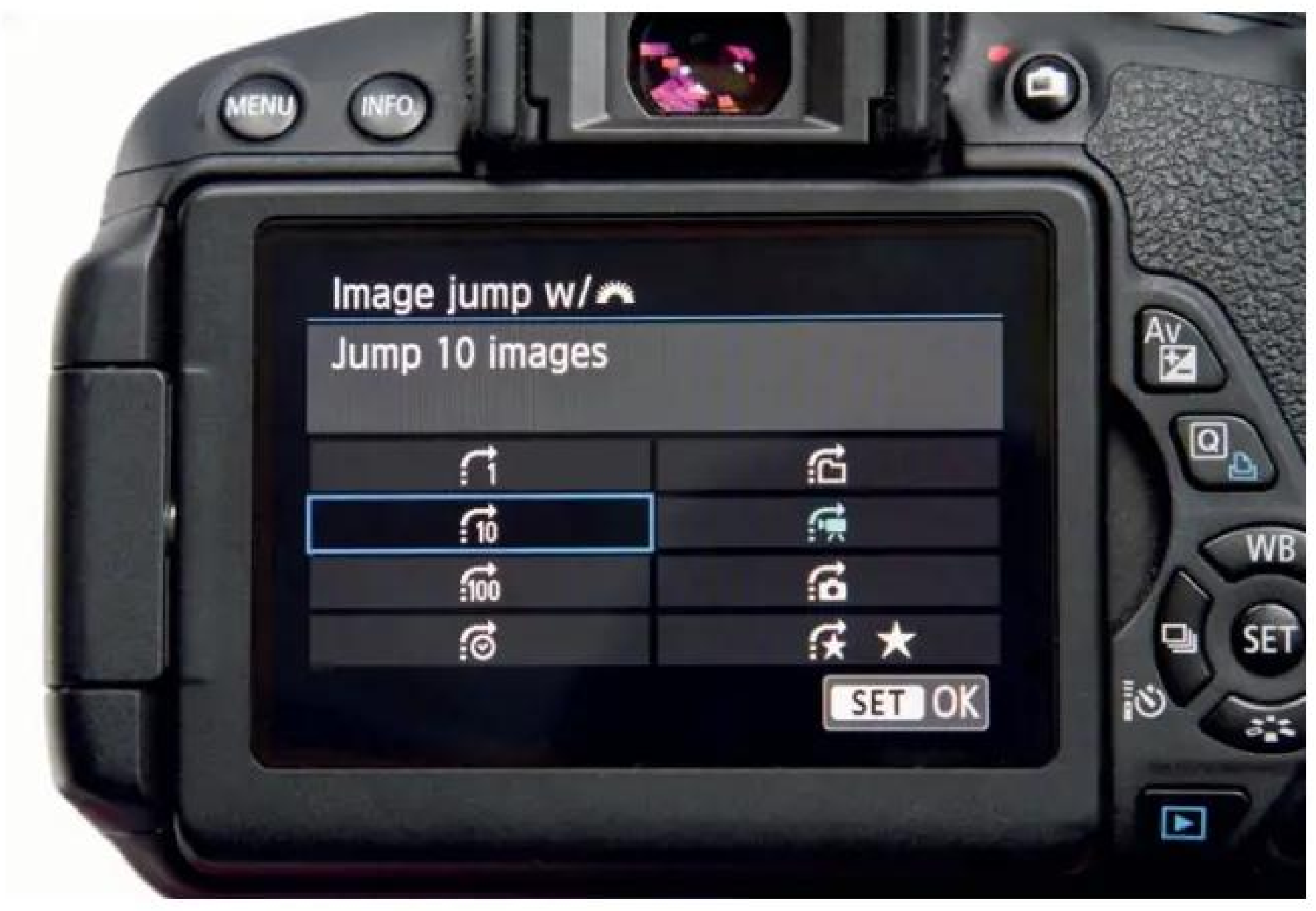
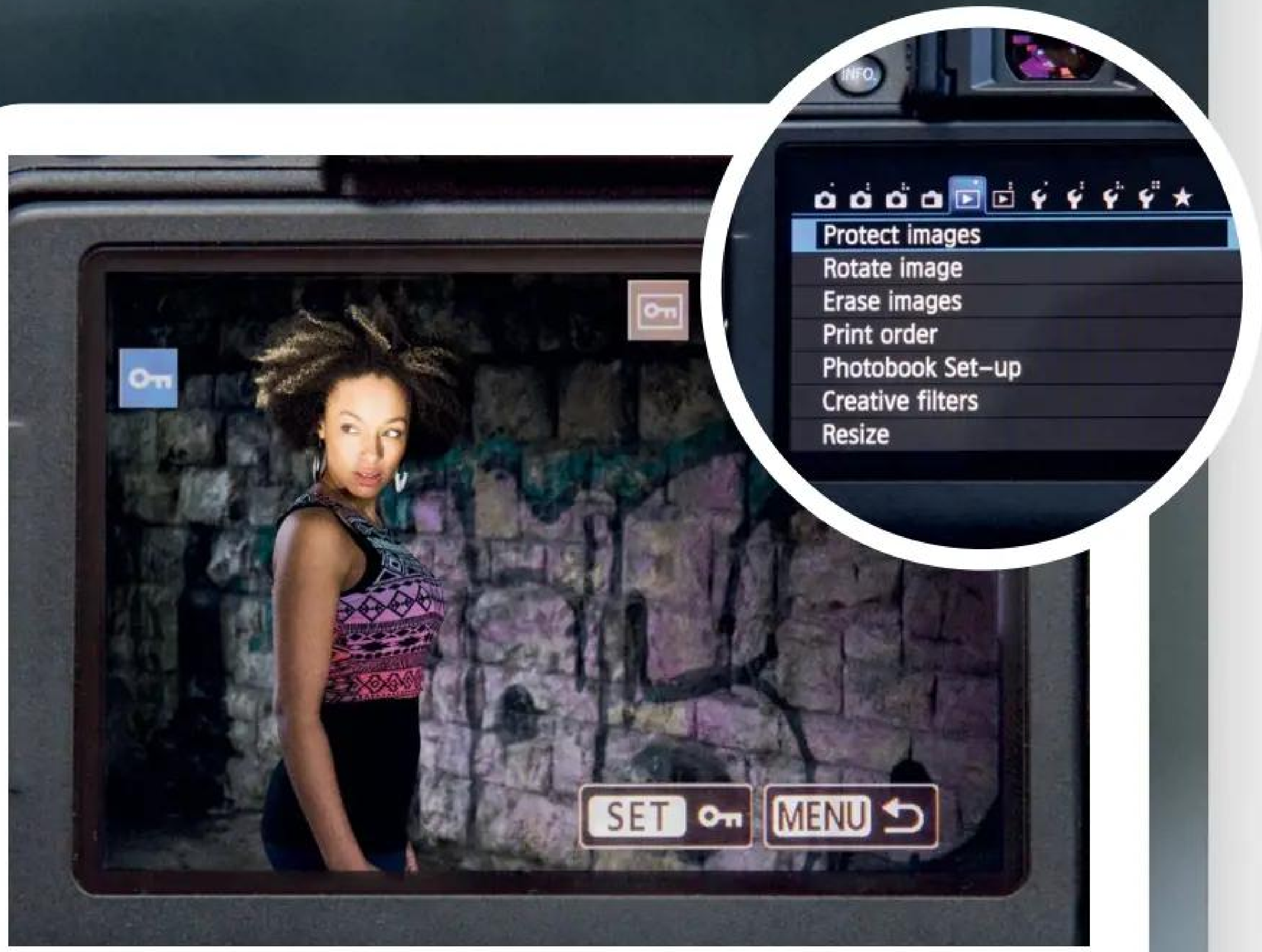


Image jump w/
Jump 10 images
SET OK

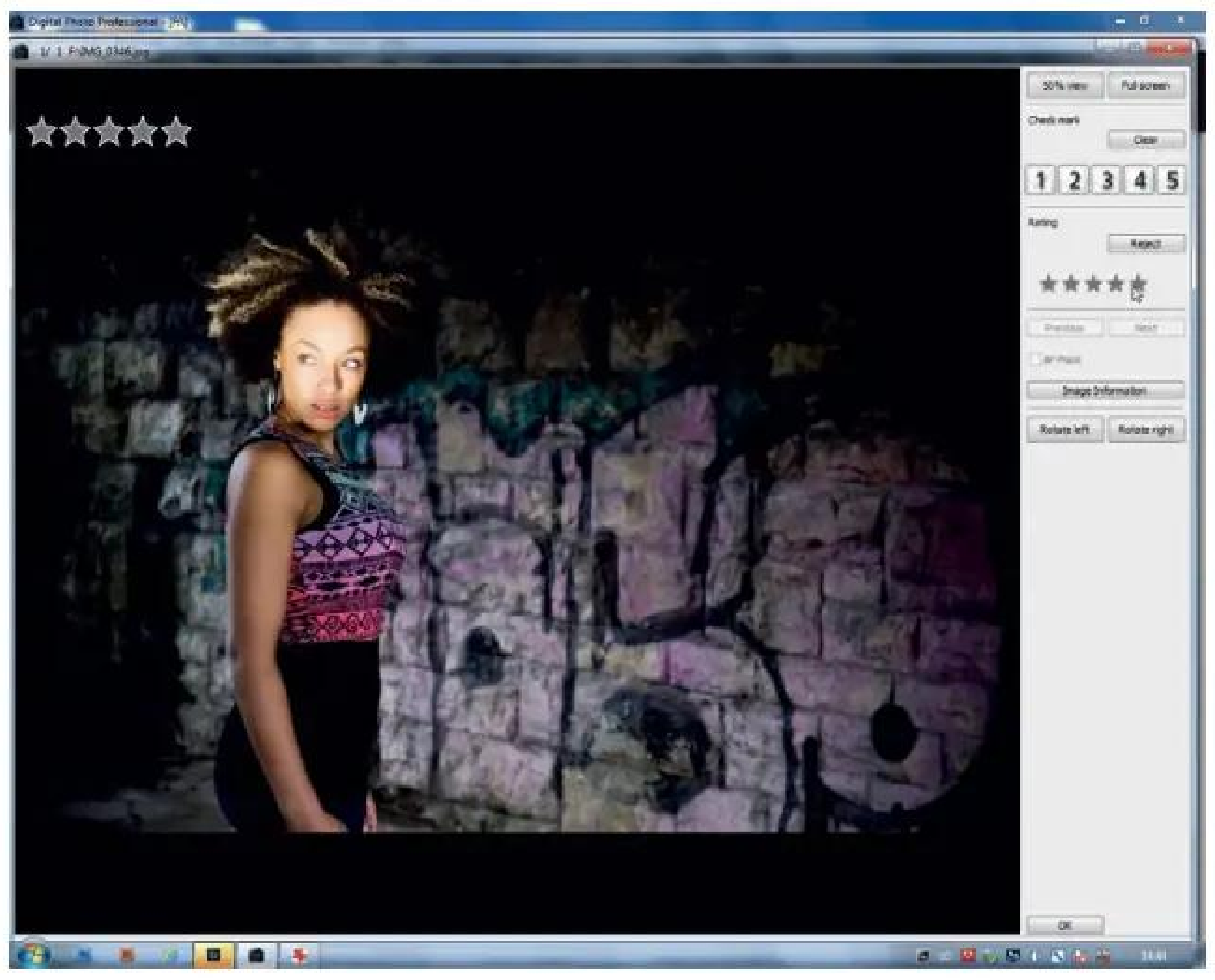
Image Jump

In the blue playback menu there’s another handy feature called Image Jump’ This setting enables you to navigate through images ten at a time, by turning the command dial in the playback mode. If you’re not that interested by this option then you can set it up to perform another function. All of the options are listed in the menu, and one of the more useful settings is to use it to find your film clips.


Protect images
Rotate image
Erase images
Print order
Photobook Set-up
Creative filters
Resize
SET
MENU

Protect your images

One useful option in the playback menu is to Protect Images. It means you won’t accidentally delete a good one. You’ll find it first on the list in the blue section of the main menu. Press Set to access and then you have a few options to choose from. Under the Select Images option, you can flick through your images using the back-panel multi-controller, and press Set once you’ve navigated to the image you want to protect. A small key icon will appear, once protected.

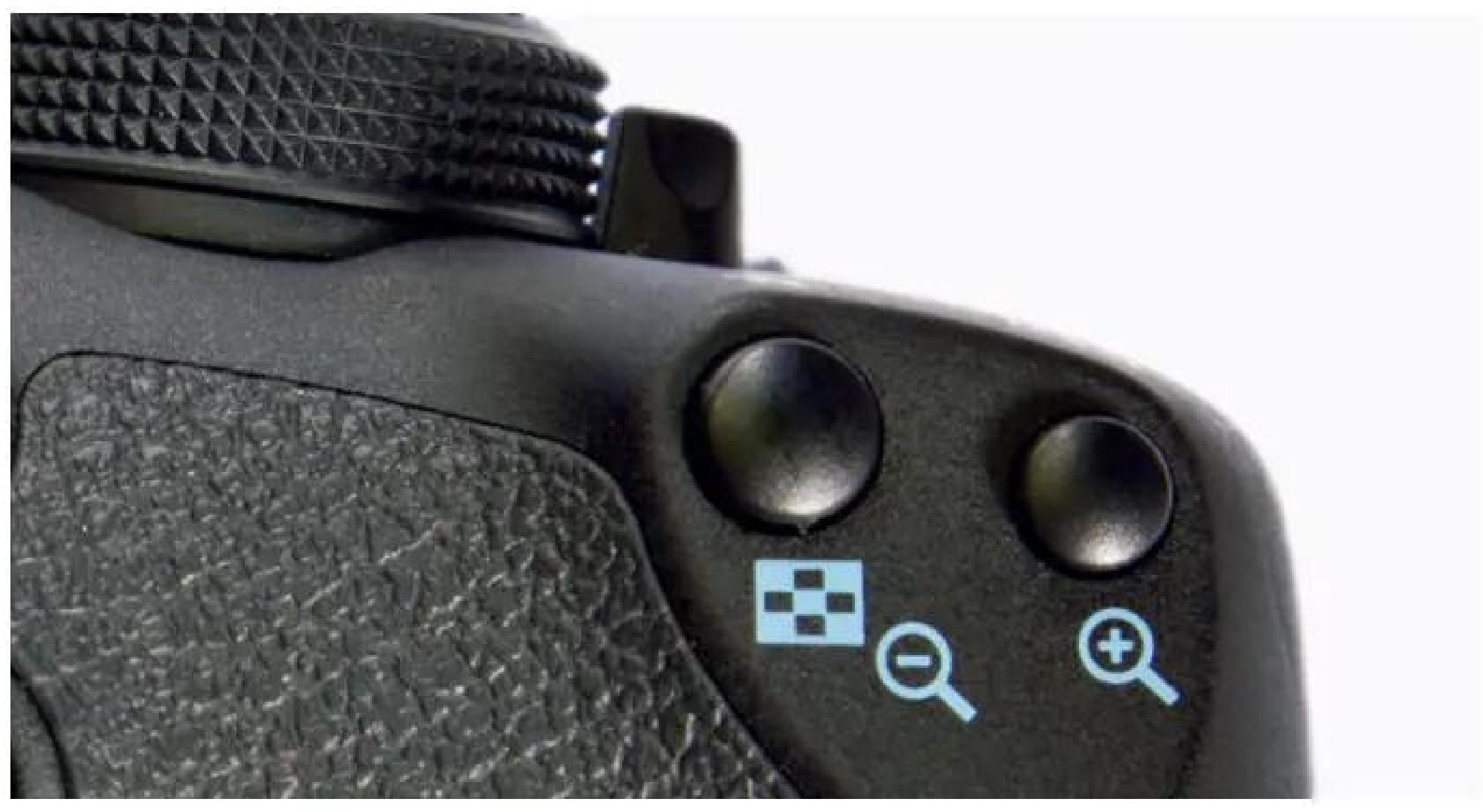


Rate your images

There are plenty of other options to choose from in the playback menu. A handy feature is to rate your images saving you time at the editing stage. Go to Rating to engage the feature, then use the up and down controls on the back-panel controller to select a star rating for the image. If you open your images in Canon’s free Digital Photo Professional software, it will remember the ratings, and you can edit your images from there.

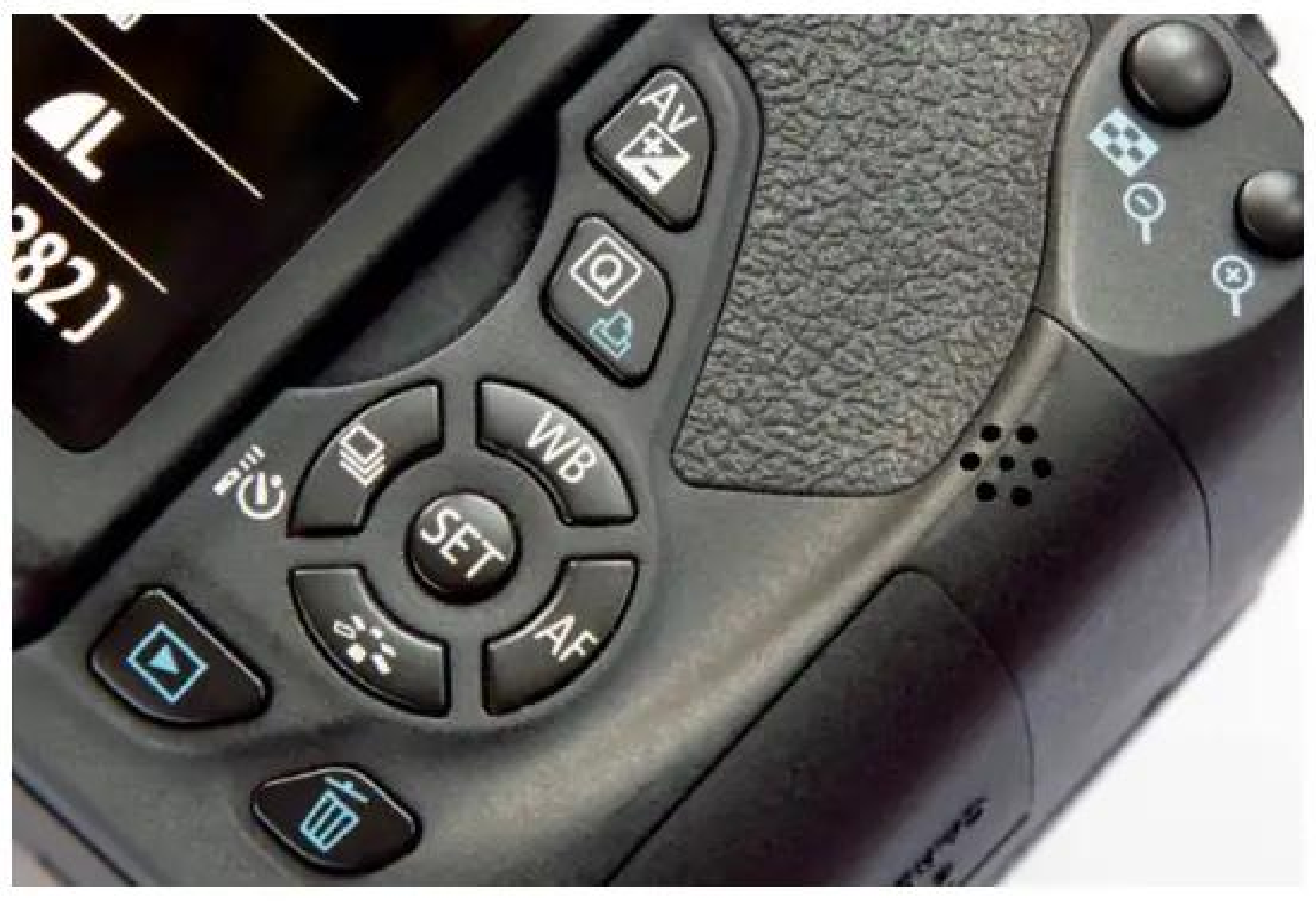
Why check the sharpness?

When out on location you should always check to see if the main focal point of your image is sharp. That way before you even get back to your computer you know that you've bagged a winner! Checking the main focal point is something you should get used to doing, and it doesn't take long to do. There's no excuse!



Zoom in

To get started press play on the back panel to bring up your images you've just shot. This camera has two buttons that will let us zoom in and out of the screen. On this model they're here at the top right-hand side of the back panel, and yours should be somewhere similar. Press the magnify button to start zooming in.

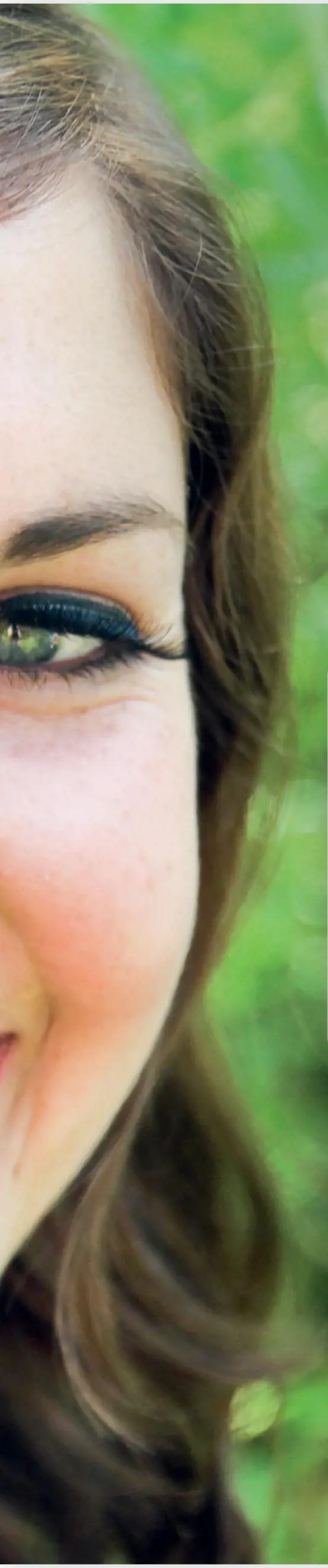


Move around

Once zoomed in, you can use the back-panel multi-controller to navigate around the image. Simply go up, down, left and right to check all around the image.

Check the sharpness

Zoom right into the image on the back-panel LCD to check the sharpness of the main focal point

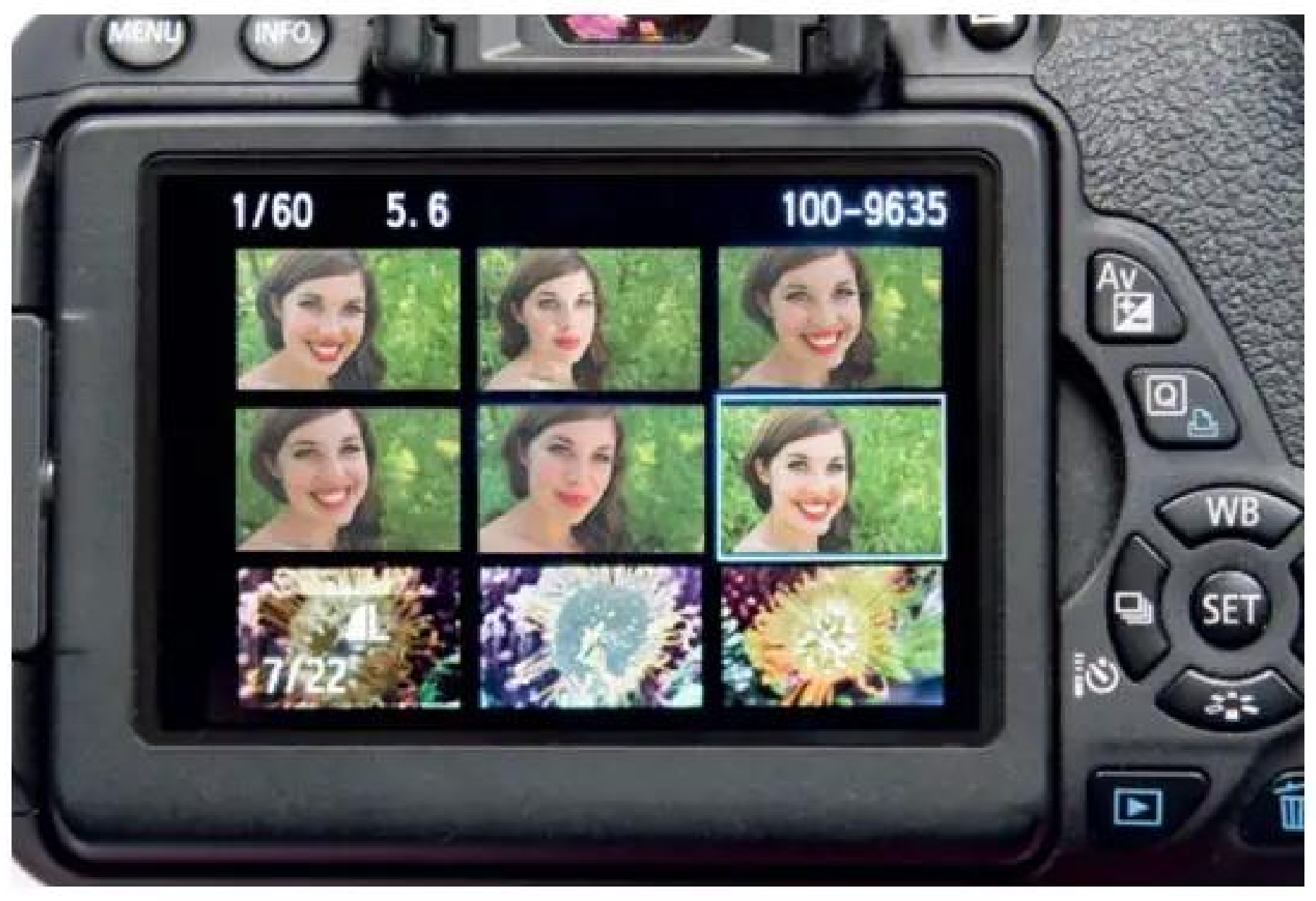


Check multiple images

If you've shot a load of images with the main focal point in the same position then you don't need to zoom back out of the image to check the next one along. Instead, use the command dial to jump to the next image in the stack.

Check the main focal point

In this example we want to make sure the eyes of the model are sharp. This is really important in portrait photography, because you want the person in your portrait to connect to your audience.



Zoom out

There's also the option to zoom out of your images and look at them in a grid formation. This is handy if you're trying to find one shot from a bunch. Keep pressing the minus button and zooming out to get to this screen. ■

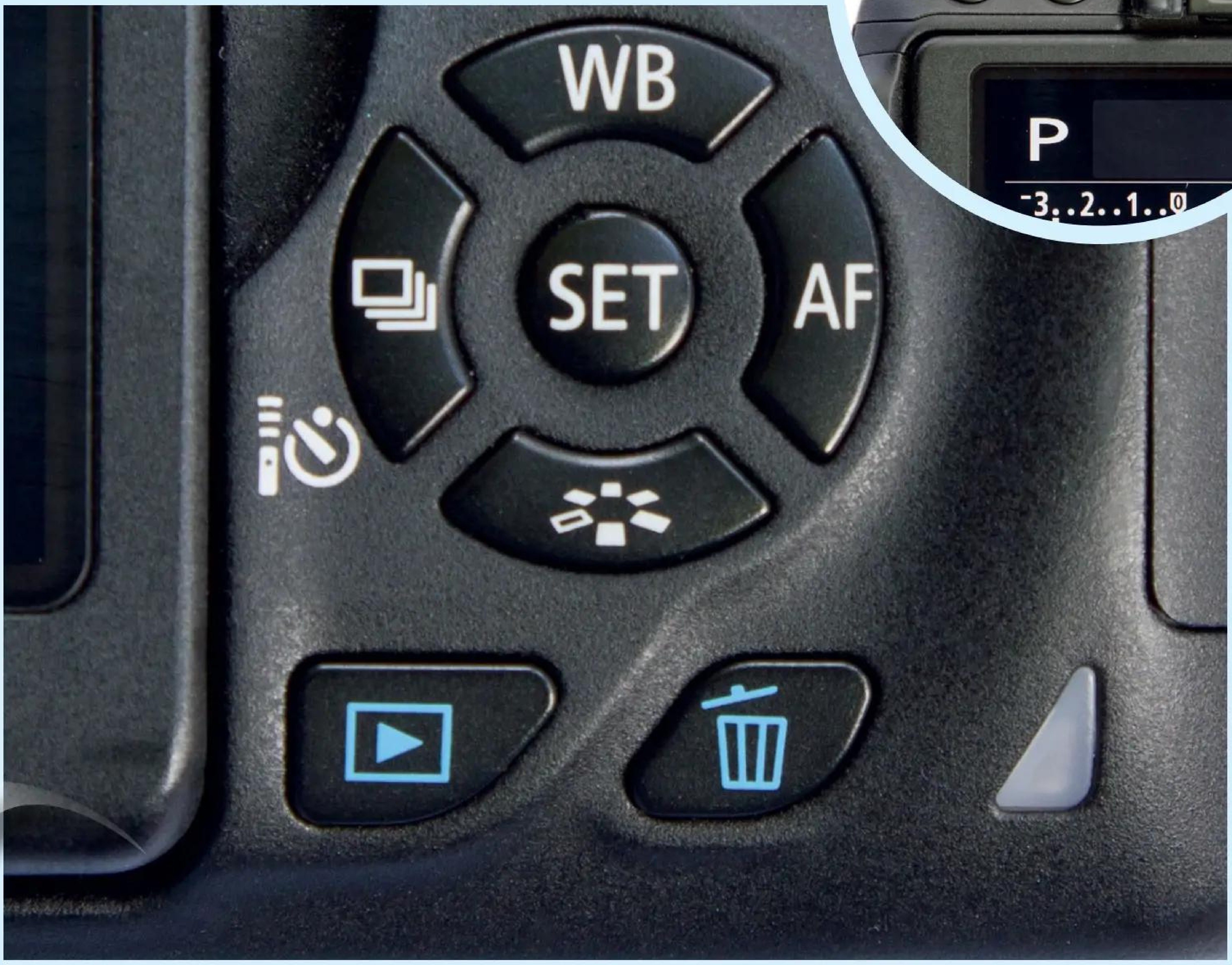
Check the exposure

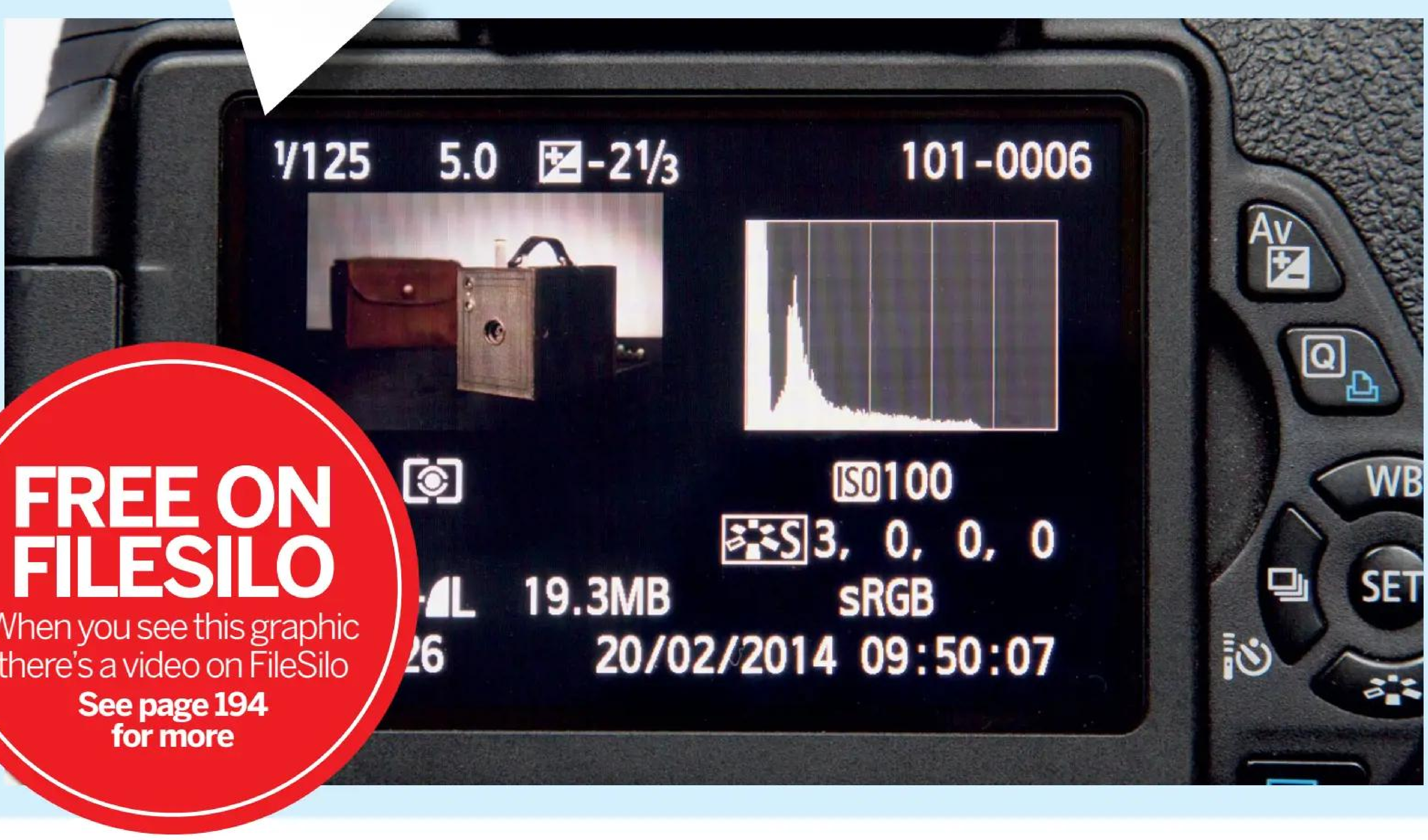
Use the in-camera histogram and highlight warnings to check the exposure of an image

1 Display the histogram

It can be tricky to get the full picture when reviewing an image on the LCD screen. For that reason we have two other helpful features that share technical information. These are the histogram and the highlight alert. Photos are made up of pixels. Each pixel contains data in code form. The histogram is an overview graph of the range of tones in the pixels in the image. To bring it up, press the playback button, then press Info or the Display button until you see the image appear next to the graph.

MENU
INFO.
P
-3..2..1..0

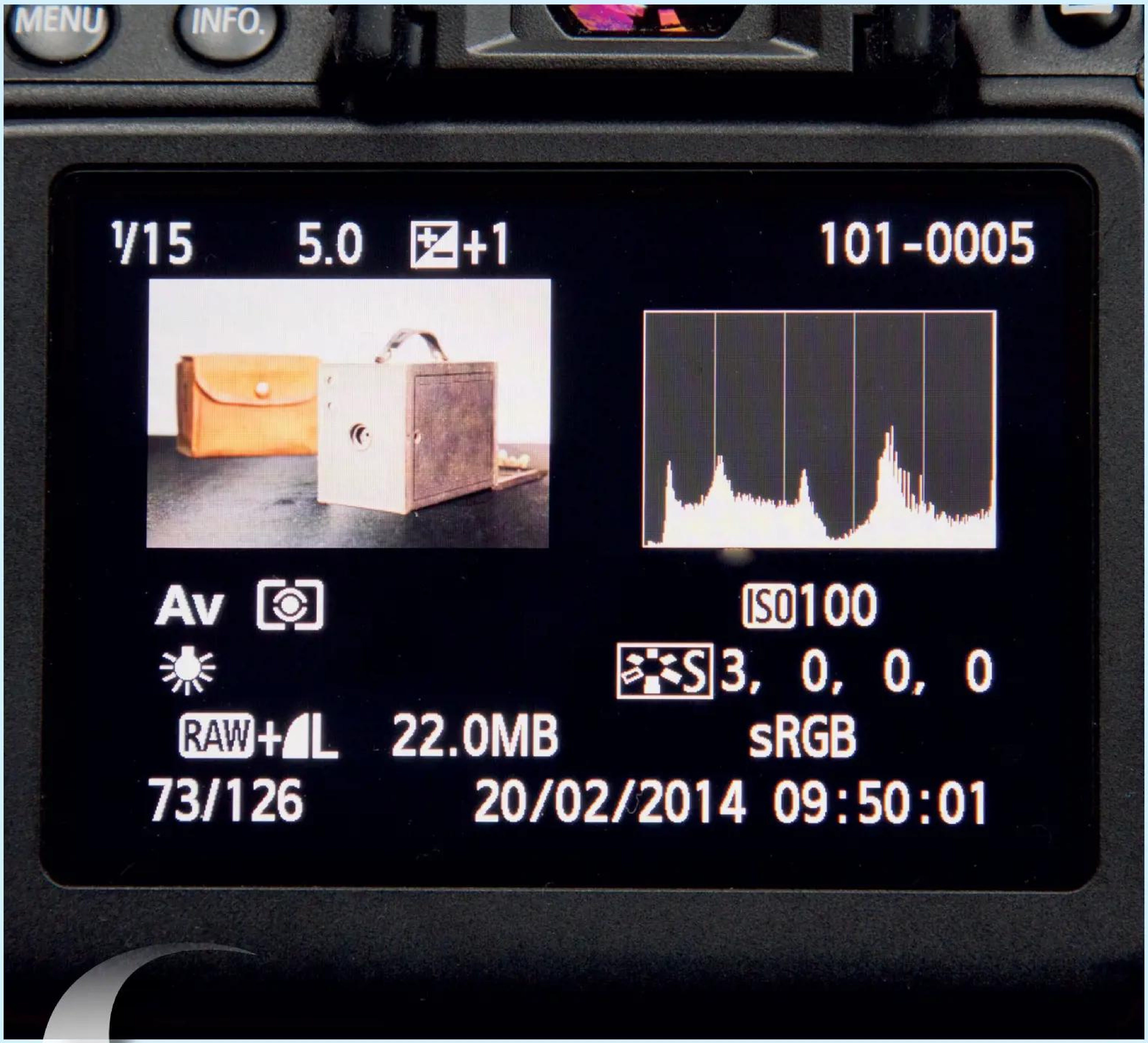




FREE ON FILESILO
When you see this graphic there's a video on FileSilo
See page 194 for more

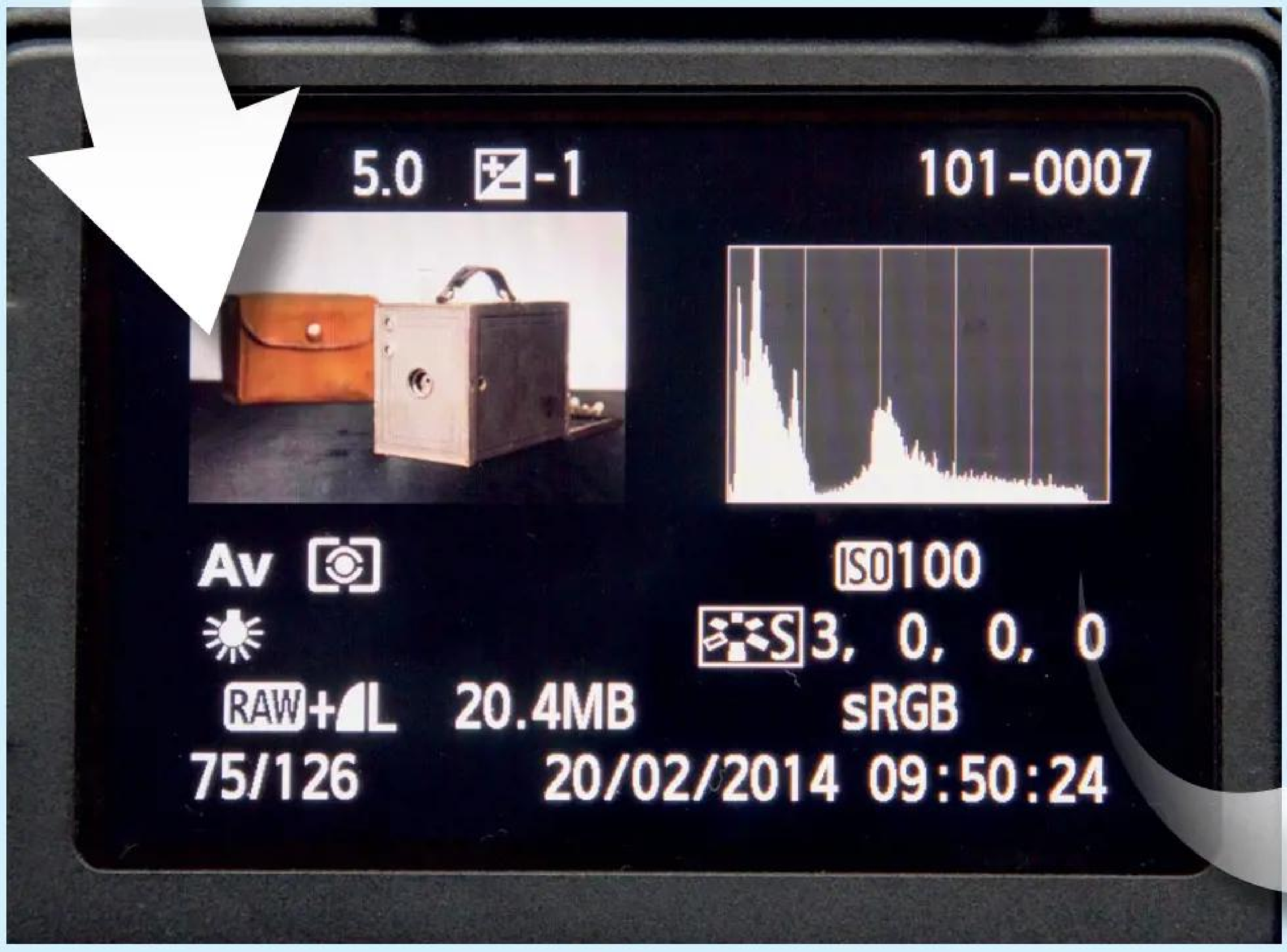
2 Too dark

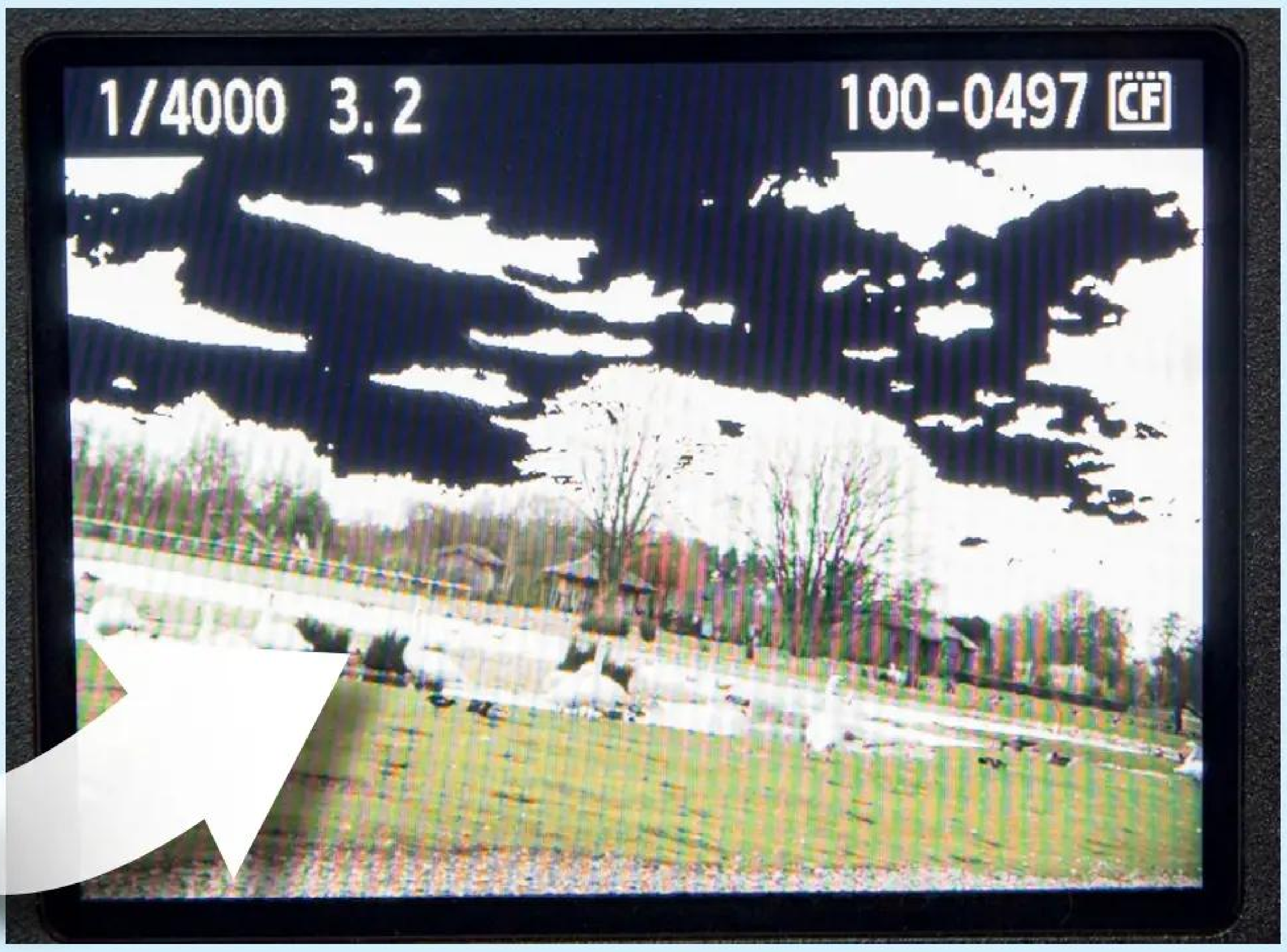
Here we have an image that's too dark and we call this 'under-exposed'. Notice how the graph is heavy on the left-hand side. It means that many of the pixels in the image are black or dark in tone and colour. If you're shooting landscapes at night your histogram will most likely look like this, because much of the scene will be dark.


MENU
INFO.
1/15 5.0 +1
101-0005
Av
ISO100
3, 0, 0, 0
RAW+L 22.0MB
sRGB
73/126
20/02/2014 09:50:01

3 Too light

Now here's an image that's too light, and we call this 'over-exposed'. The lines of the graph have gone outside the edge on the right-hand side, showing we have pixels in the image that contain no data. You can't do anything with these pixels at the editing stage. That's why when you're shooting it's important to look at your histogram to check that you have no over-exposed bits in the image.


5.0 -1
101-0007
Av
ISO100
3, 0, 0, 0
RAW+L 20.4MB
sRGB
75/126
20/02/2014 09:50:24


1/4000 3.2
100-0497 CF

4 Just right

Here's a correctly exposed version of the scene. The graph appears more even and stays within the edges. The only time you'll see a perfectly curved graph is when you're shooting in very flat light. When you're shooting in high-contrast light, you'll notice your graph appears more uneven. This doesn't necessarily mean your image is incorrectly exposed; you just want to make sure you haven't over-exposed any parts.

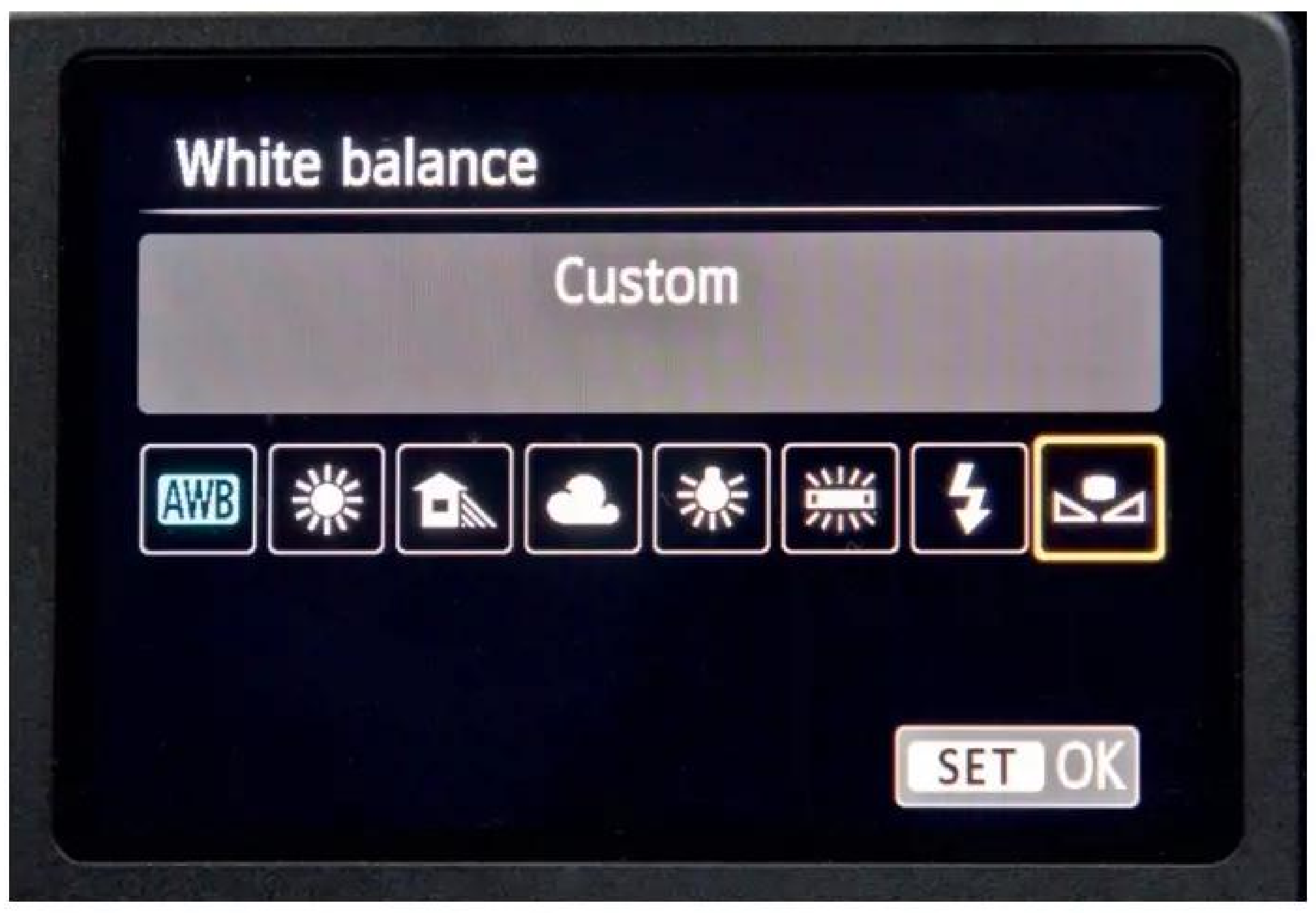
5 Highlight alerts

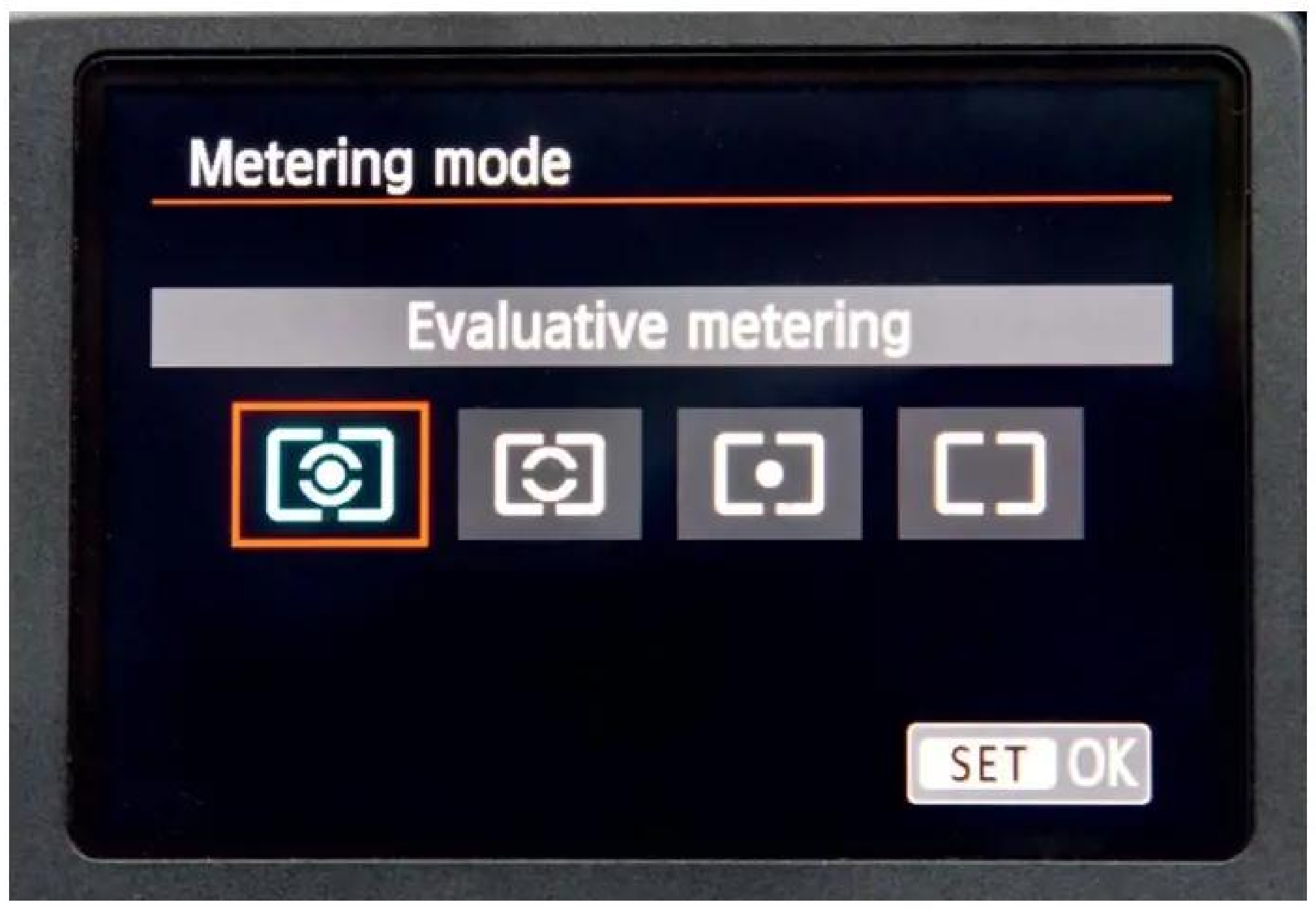
Another handy feature that will let you know if your image has over-exposed parts is the blinking highlight alert. You'll find this in the blue playback part of your camera's menu under Highlight alert. Note that not every Canon DSLR has this feature. If you have any areas in the image that have blown out (this means the pixels contain no data) then those pixels will flash black. It's really handy to have it engaged when quickly reviewing your shots.

Av
SET
WB
AF

MENU
INFO
Drive mode
Self-timer:10sec/remote
SET OK
Av

ISO
SCN
M
Av
Tv
P
CA
ON
OFF


White balance
Custom


Metering mode
Evaluative metering

Take full control with manual mode

Learn how to take full control of your Canon digital SLR and capture the perfect shot every time

90 Exposure compensation
Make your image lighter or darker using the exposure compensation feature on your DSLR

92 Metering modes explained
Learn how to assist your camera's metering system by choosing the appropriate mode for a given scene

96 Drive modes explained
Match the drive mode to the subject matter for more successful photo shoots

100 White balance explained
Find out how to adjust the white balance to remove undesirable colour casts from your photos

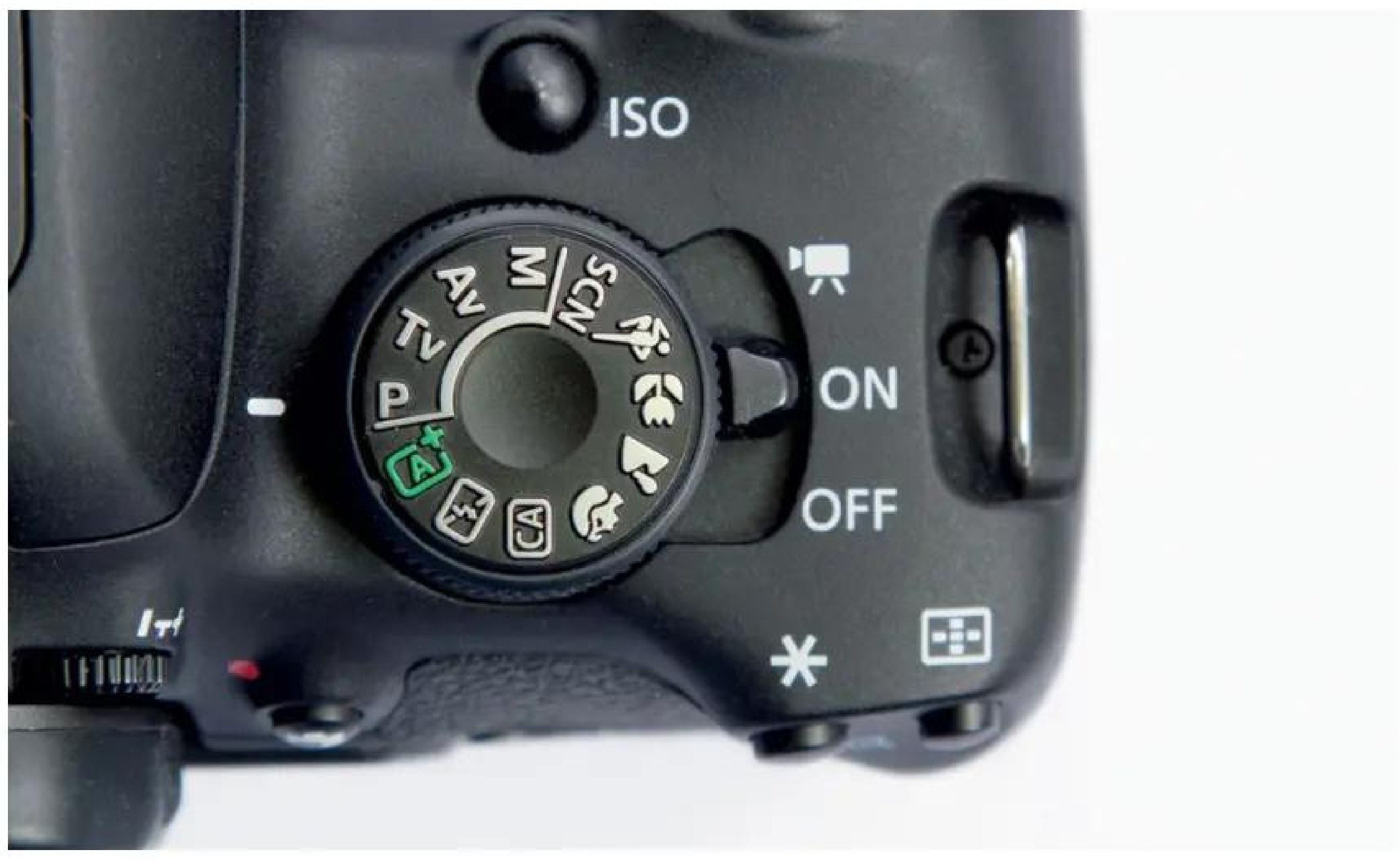
104 ISO sensitivity explained
Adjust the ISO sensitivity of your Canon DSLR to get better exposures in any lighting conditions while keeping noise under control

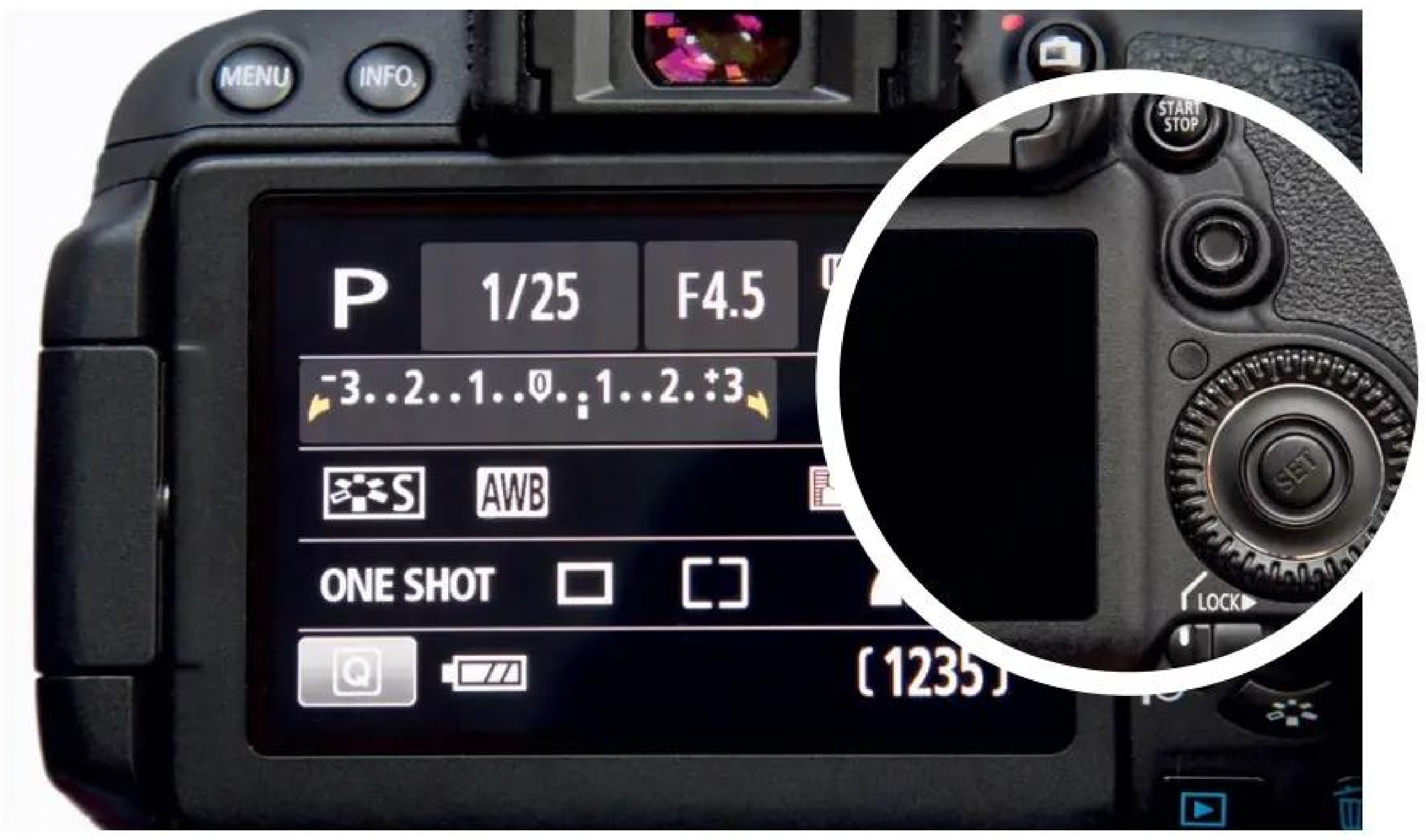
Exposure compensation

Make your image lighter or darker using the exposure compensation feature on your DSLR

The exposure compensation meter is an extremely useful feature on your Canon DSLR. You can use it when shooting in the P mode, Av mode and Tv mode. These are the semi-automatic shooting modes, which enable you to control some aspects of your camera settings to determine exposure.

Cameras aren't infallible, and they may not get the exposure settings spot-on all of the time, so for this reason we can add or take away light using the exposure compensation feature. We do this in stops of light. Actually, the exposure compensation function is broken down into thirds of a stop of light. Each time you nudge it up or down the scale, that's a third of a stop. A full stop is indicated by the numbers on the scale. How much you should move the needle depends on the lighting conditions, but generally you should only make small adjustments to tweak the final result. Follow the step-by-step guide to learn how to tweak the exposure compensation to get more accurate results.


ISO
ON
OFF
P
Tv
Av
M
SCN
CA

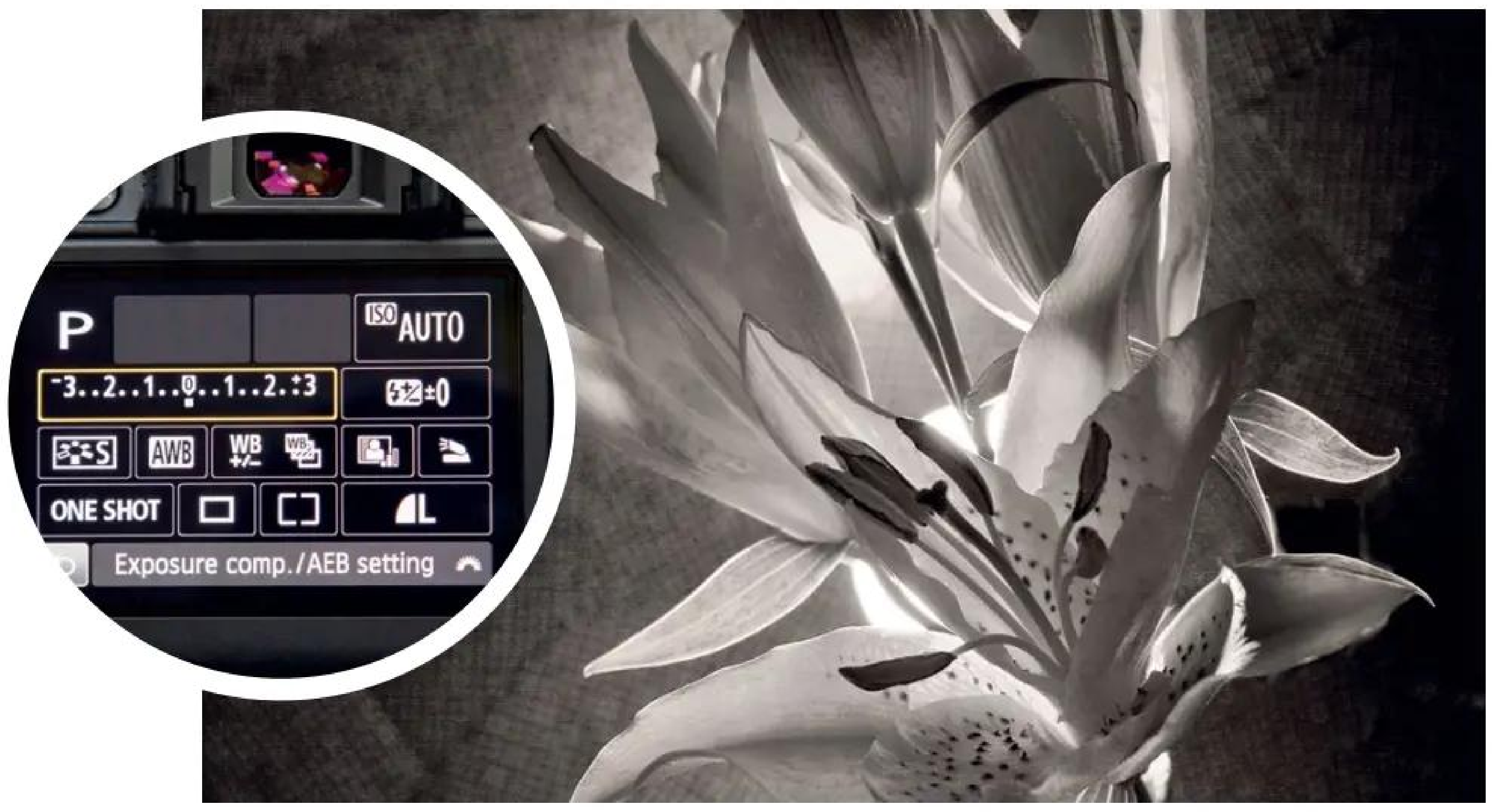

MENU
INFO.
P
1/25
F4.5
-3..2..1..0..1..2..+3
AWB
ONE SHOT
[1235]
START STOP
LOCK

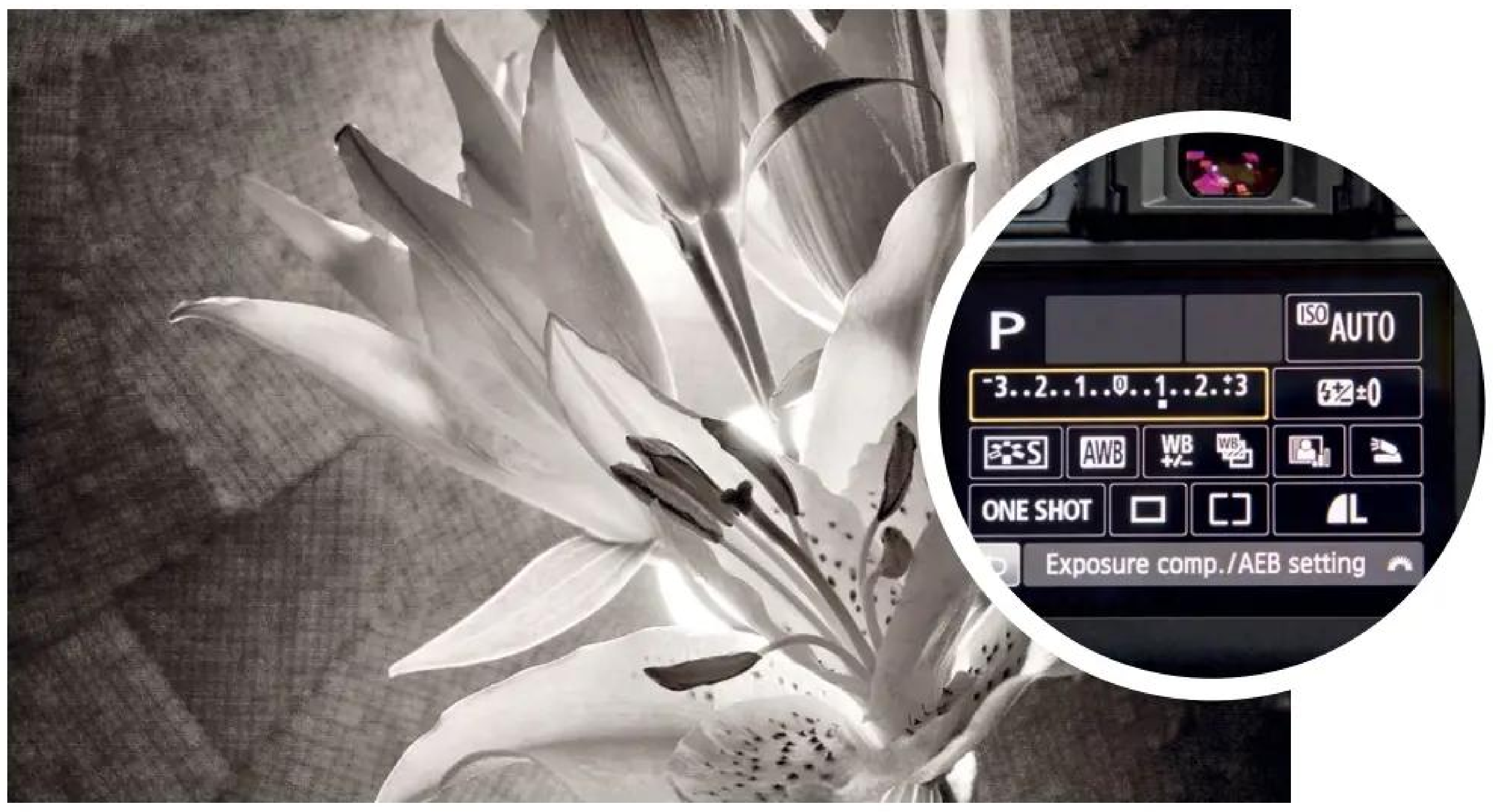
1 Choose a shooting mode

To access the exposure compensation mode you first need to be in one of the semi-automatic shooting modes. These are program, aperture priority and shutter priority. The exposure compensation feature won't work in the fully automatic mode or any of the scene modes. In this example we're putting the camera into program mode.

2 Adjust the compensation

We can now alter the exposure compensation in a couple of ways. On a beginner model hold down the plus/minus button, then turn the main command dial to adjust the needle up and down the scale. If you have a more advanced model that doesn't have this plus/minus button, use the back-panel multi-controller to move the needle.


P
ISO AUTO
-3..2..1..0..1..2..+3
±0
AWB
ONE SHOT
Exposure comp./AEB setting

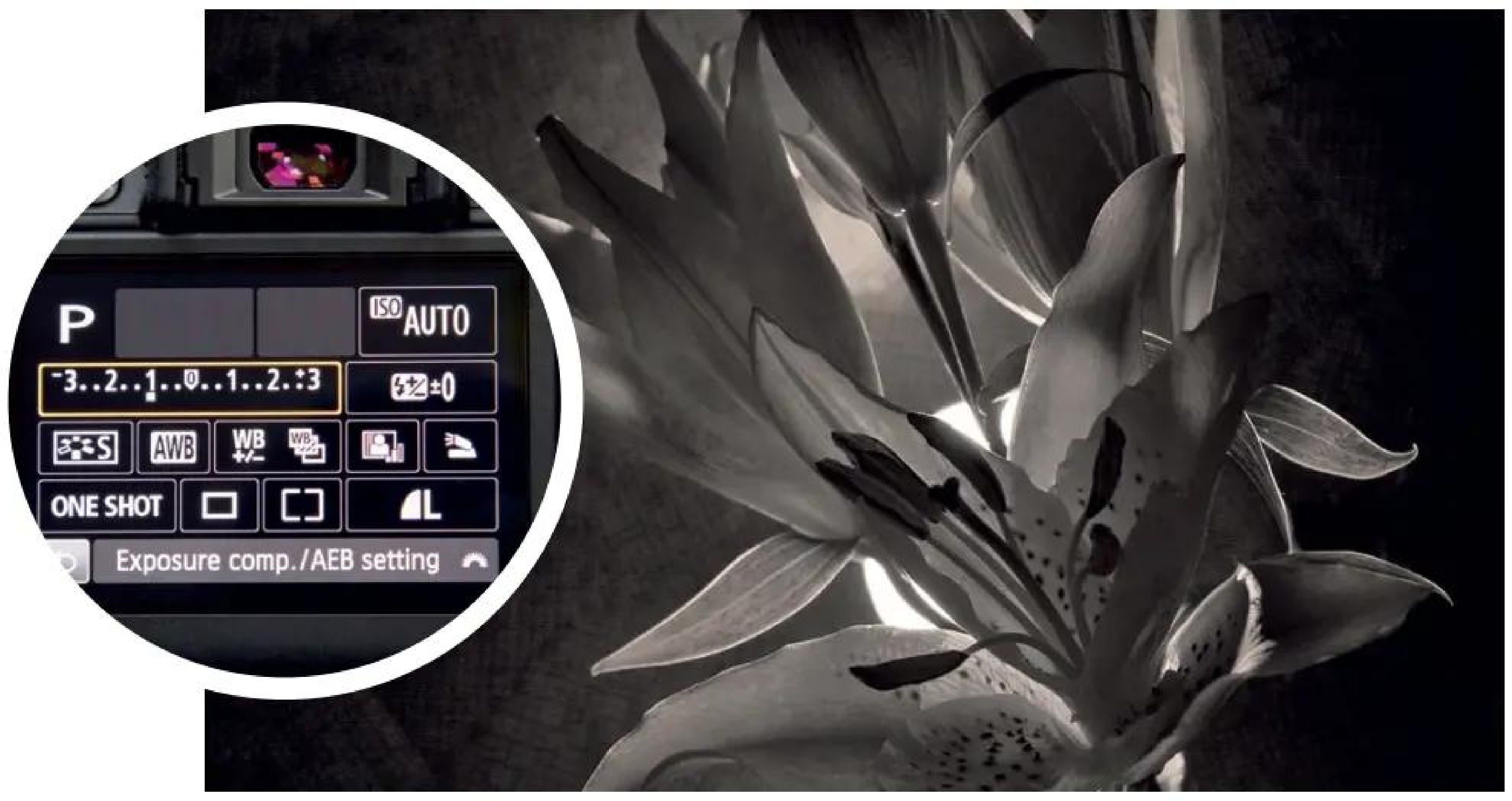

P
ISO AUTO
-3..2..1..0..1..2..+3
±0
AWB
ONE SHOT
Exposure comp./AEB setting

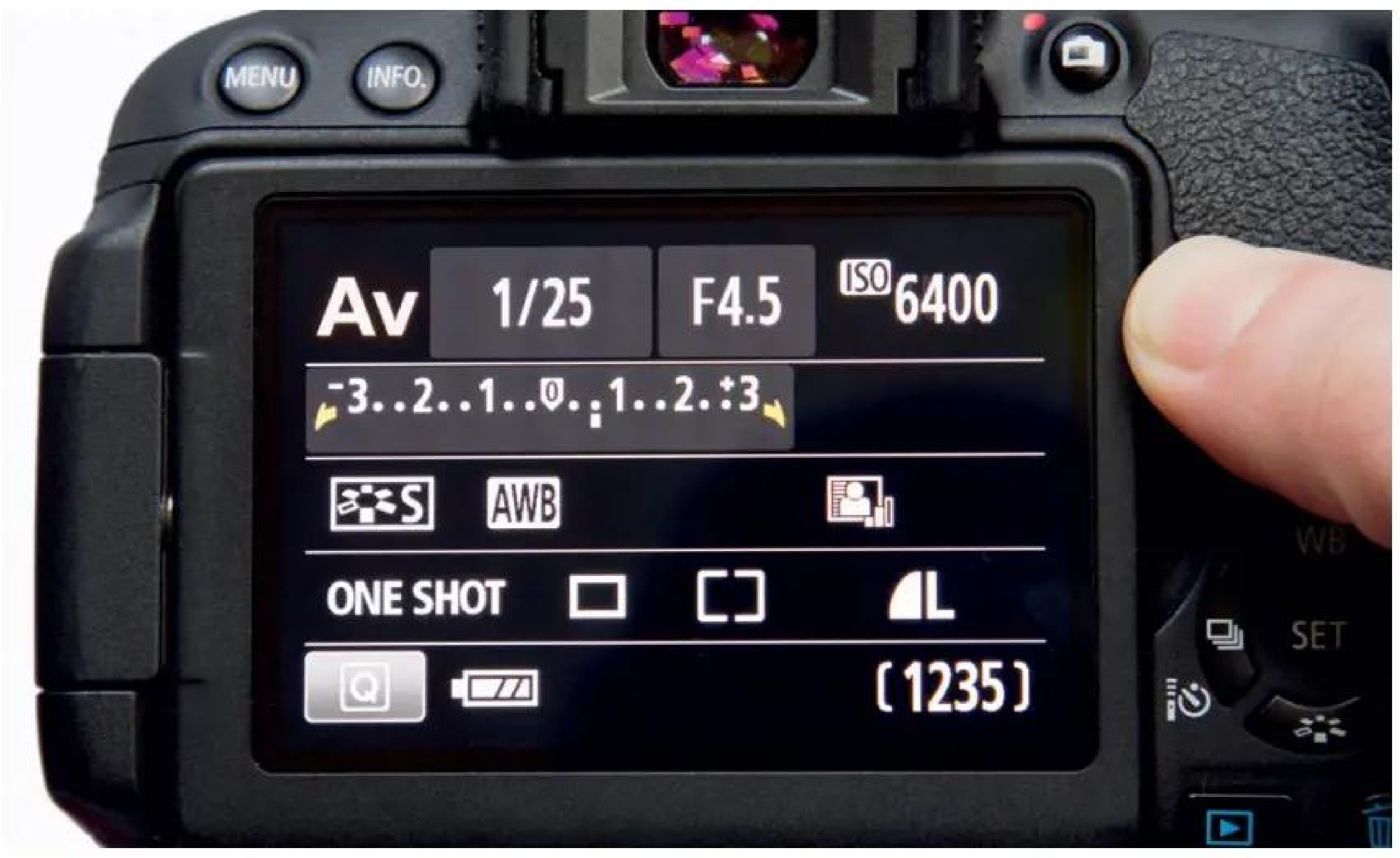
3 Make a normal exposure

Let's look at a real-world example. Set up your shot so that you're happy with the composition. We've simply created a still-life scene using back-lit flowers lit by a household lamp with some old wallpaper as a backdrop. When you take a photo with the exposure meter in the centre, the result looks like this.

4 Over-expose the scene

The camera has guessed pretty accurately what it thinks the exposure settings should be, but there's room for improvement. In this example we're going to push the exposure compensation one stop to the right to make the image appear lighter. We could also have increased the exposure by just fractions of a stop.


P
ISO AUTO
-3..2..1..0..1..2..+3
±0
AWB
ONE SHOT
Exposure comp./AEB setting

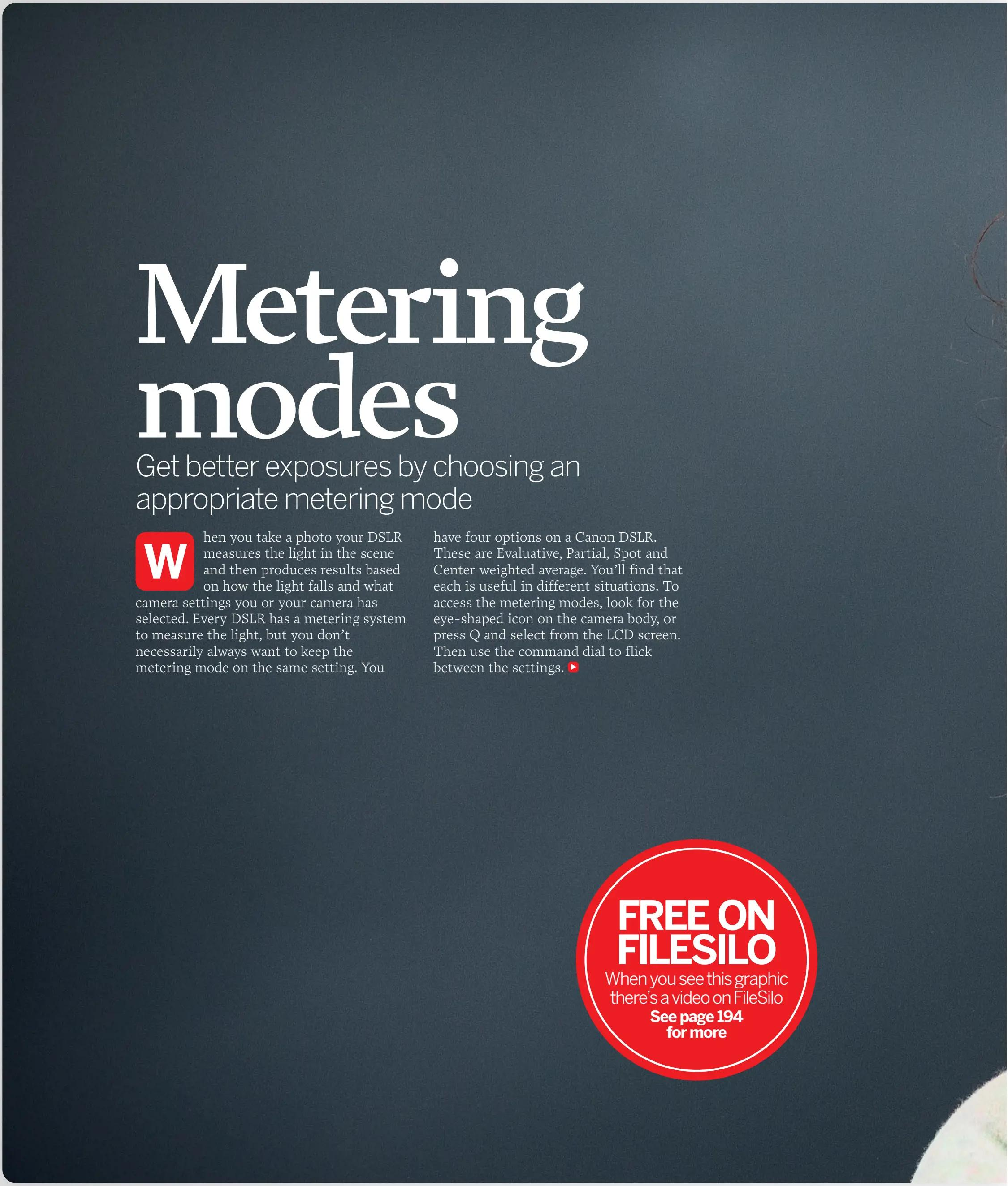

MENU
INFO.
Av
1/25
F4.5
ISO 6400
-3..2..1..0..1..2..+3
AWB
ONE SHOT
[1235]
SET

5 Under-expose the scene

We can also go the other way and make the image darker. So here we've pushed the exposure compensation to minus one on the meter, and the result is a much darker image. If you want to make it even darker you can keep subtracting light from the exposure by moving the needle further to the left.

6 Keep up to speed

When you adjust the exposure compensation, your camera settings change. For example, if you're shooting in Av mode, your camera will keep the aperture at the same setting, but will adjust the shutter speed accordingly. Take care when shooting with the camera handheld – if the shutter speed drops too low you can produce camera shake.



Metering modes

Get better exposures by choosing an appropriate metering mode

When you take a photo your DSLR measures the light in the scene and then produces results based on how the light falls and what camera settings you or your camera has selected. Every DSLR has a metering system to measure the light, but you don't necessarily always want to keep the metering mode on the same setting. You have four options on a Canon DSLR. These are Evaluative, Partial, Spot and Center weighted average. You'll find that each is useful in different situations. To access the metering modes, look for the eye-shaped icon on the camera body, or press Q and select from the LCD screen. Then use the command dial to flick between the settings. ▶

FREE ON FILESILO

When you see this graphic there's a video on FileSilo

See page 194 for more

MENU
INFO
Metering mode
Evaluative metering
SET OK
Av
Q

Metering explained

Learn how to assist your camera's metering system by choosing the appropriate mode for a given scene

It's very useful to be aware of the alternative choices we have when it comes to metering, because choosing the right metering mode is the key to making correct exposures. However, it's worth noting that for the majority of the time, you'll keep it set to the Evaluative metering mode. This is the mode your Canon DSLR is set to by default. If you want to lock the exposure settings, you need to press the star button at the top right-hand corner of the back panel. You can then re-frame the shot and shoot with your saved exposure settings. If, however, you don't want to shoot with these settings, press the grid symbol next to it and carry on.

Metering mode
Evaluative metering
SET

1 Evaluative

The first on the list, and the one you'll use the most, is Evaluative. It works by measuring the light across the whole frame, but is biased towards the main focus point. This gives you the best chance of getting a correctly exposed subject and background.

Metering mode
Partial metering
SET

2 Partial

Next we have Partial metering, which, as the name suggests, measures part of the scene. It concentrates on the area in the middle of the frame, approximately nine per cent of the viewfinder area. This setting is useful when photographing high-contrast scenes.

Metering mode
Spot metering
SET

3 Spot

Spot metering only measures a small section of the scene. This is useful when you want to get an accurate reading of an object or small space in the frame. Again, use this when shooting in high-contrast light if you're concerned that your main subject will over- or under-expose.

Metering mode
Center–weighted average
SET

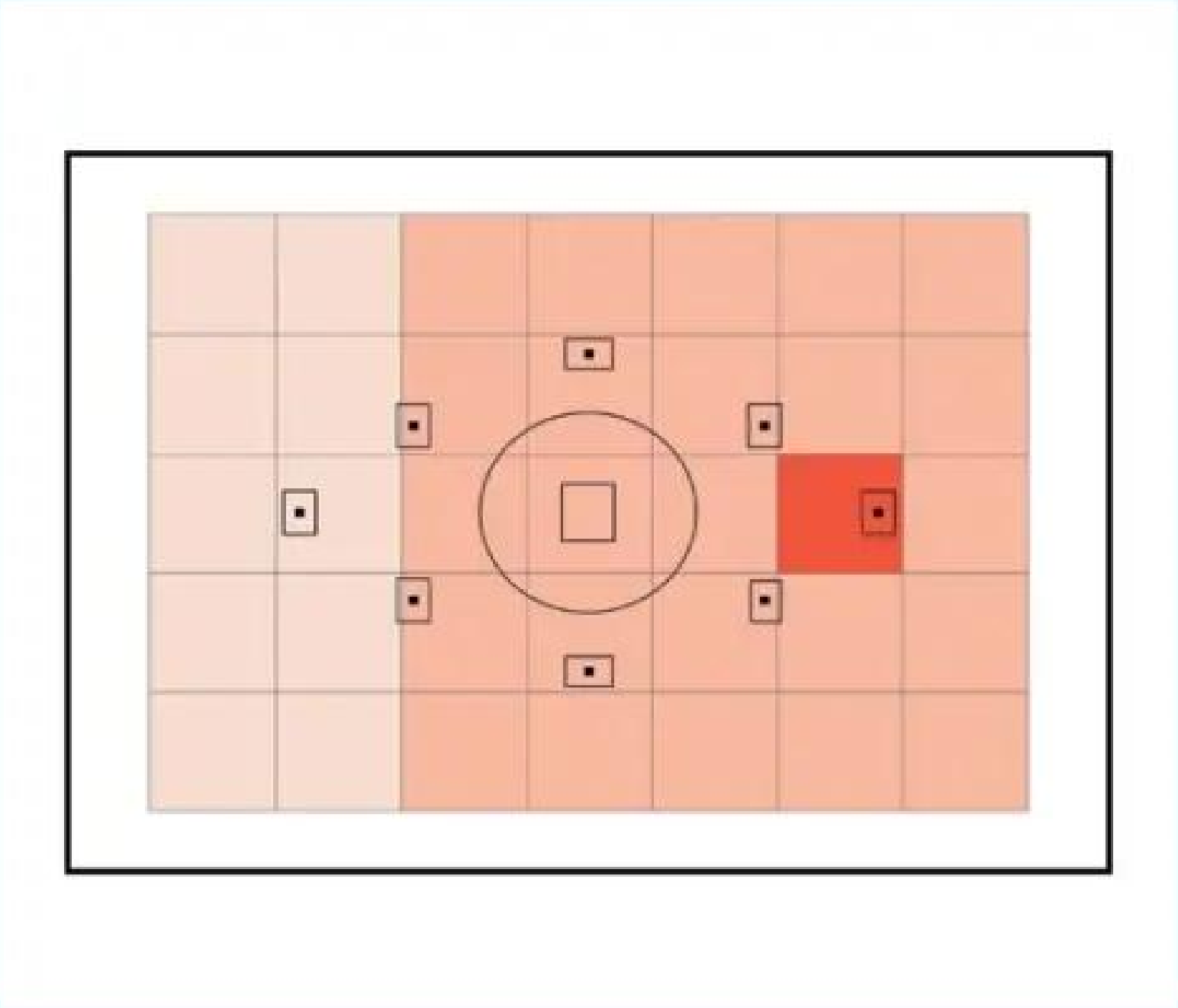
4 Center weighted average

Finally, we have Center weighted average, which measures the light coming from the whole scene but with a bias towards the centre of the frame. It's like the Evaluative setting, but it doesn't take into account where the main focus point is set.

INFOGRAPHIC

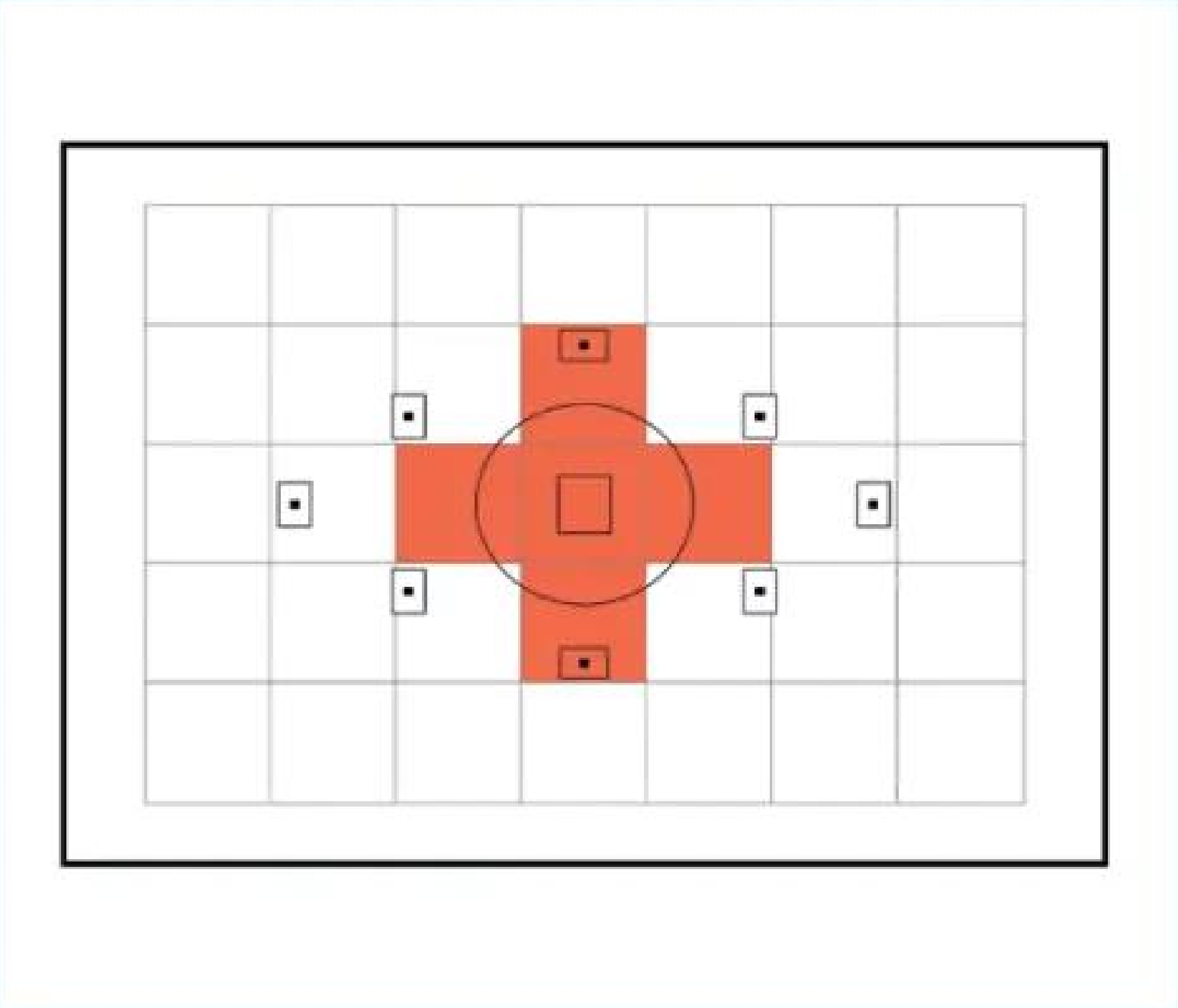
Here comes the science bit…

Discover which parts of the scene each metering mode concentrates on to determine exposure



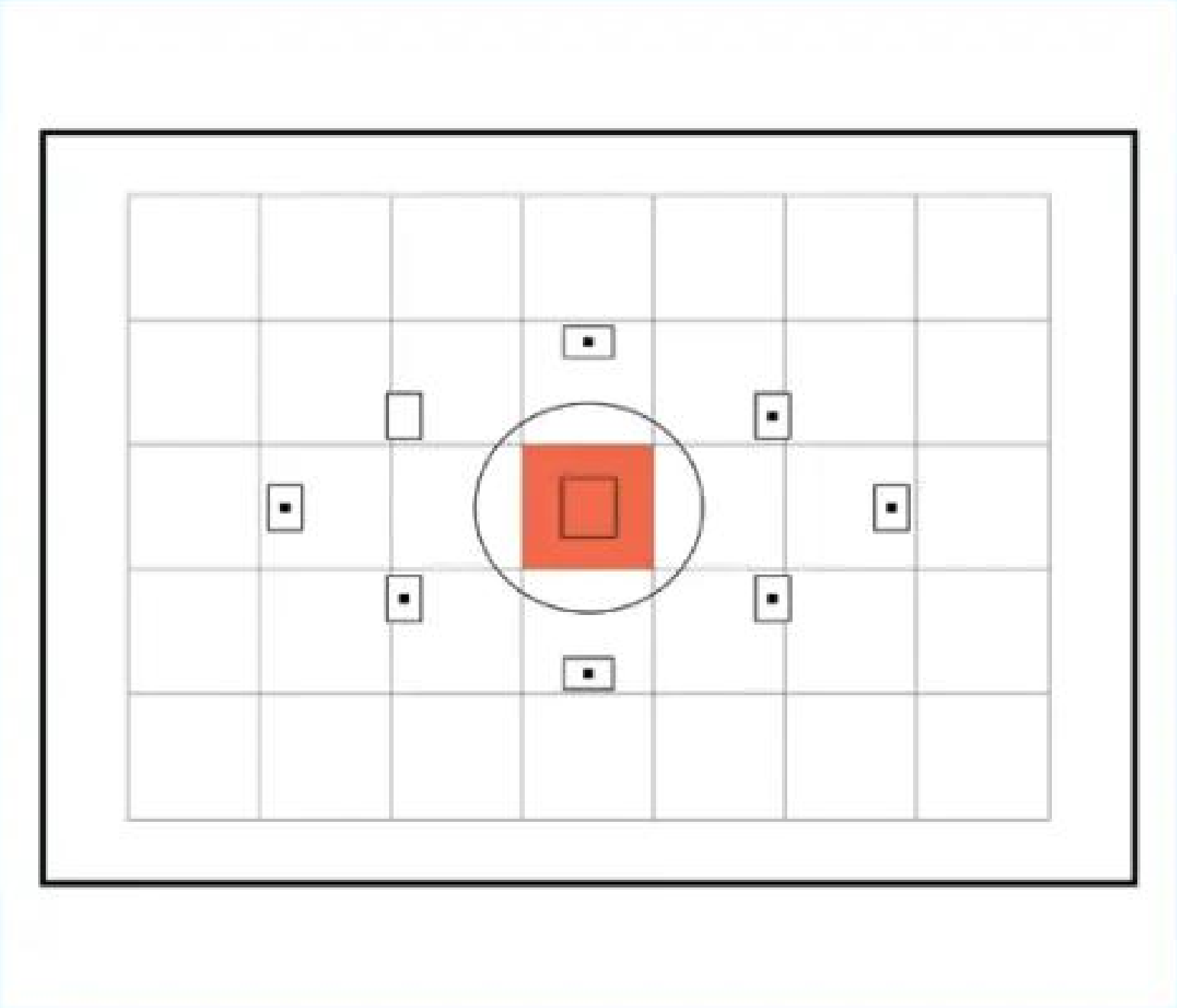
Evaluative

If we look at this diagram of the Evaluative mode, you can see how it covers the whole frame. Note that the main focus point in this example is on the right-hand side, hence the bias in that area.



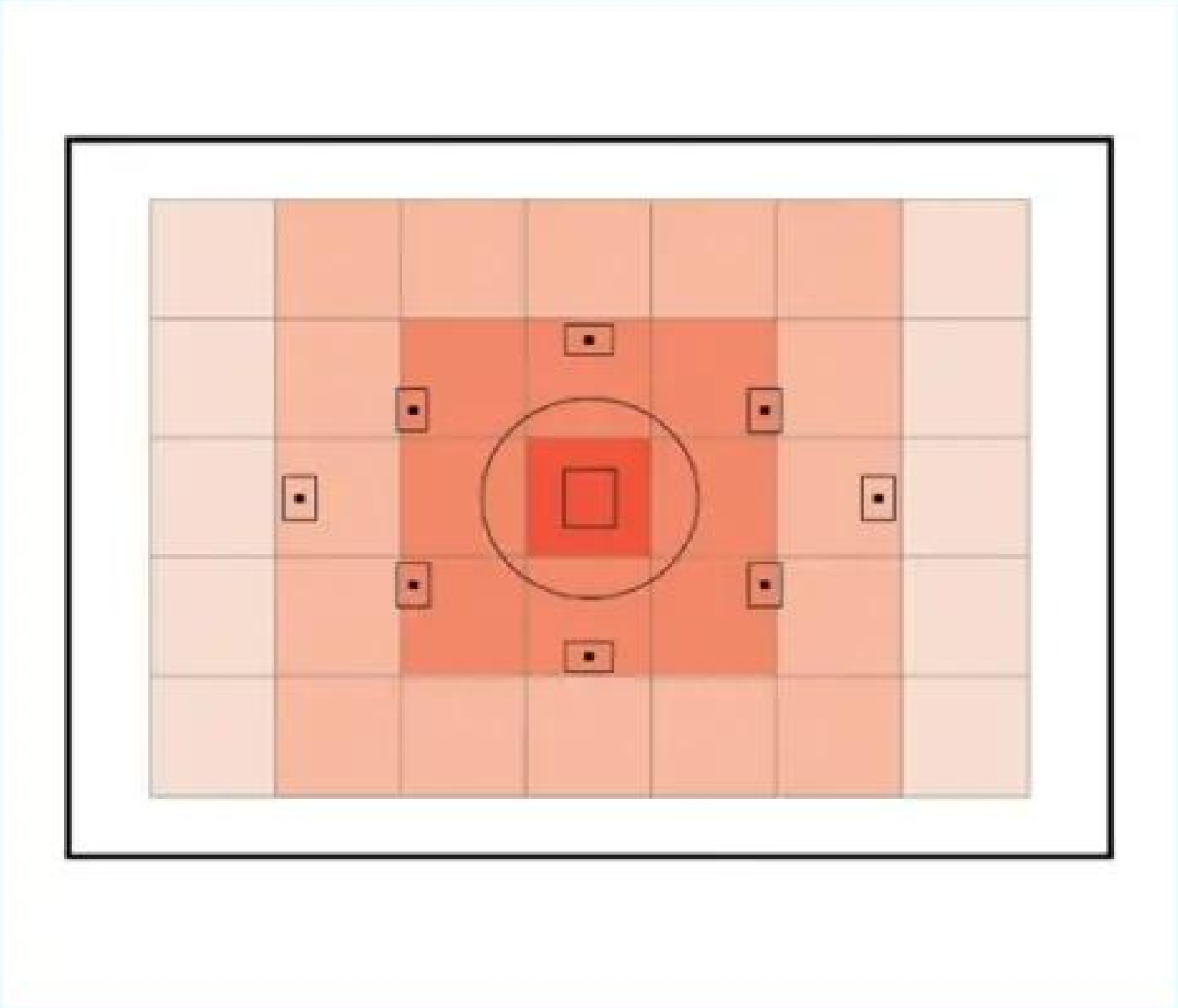
Partial

In the Partial metering mode the average is calculated by measuring only 8-13% of the picture. That's not much so it's best used when you need just the main subject in the image correctly exposed.



Spot

With Spot metering the average is calculated by measuring just 2-4% of the picture. Spot metering can be useful when you want to take quick meter readings from different parts of the scene.



Center weighted

As you can see from the dark area in the centre, Center weighted average is more biased towards the middle of the scene. It's best to stick to Evaluative if shooting moving subject matter. ■

Drive modes

Take a single shot, a burst of shots, or set the self-timer

Capturing the moment isn't easy, especially if you're photographing some sort of high-speed sporting event. To increase your chances of getting a good image, you can change the drive mode on your DSLR to fire off a succession of shots. We call this a burst sequence.

The drive mode button on your Canon camera is marked by a stack of boxes, and is on the back panel. If you have a more advanced model, the button may be on the top panel of your DSLR. Turn the page to find out more... ▶

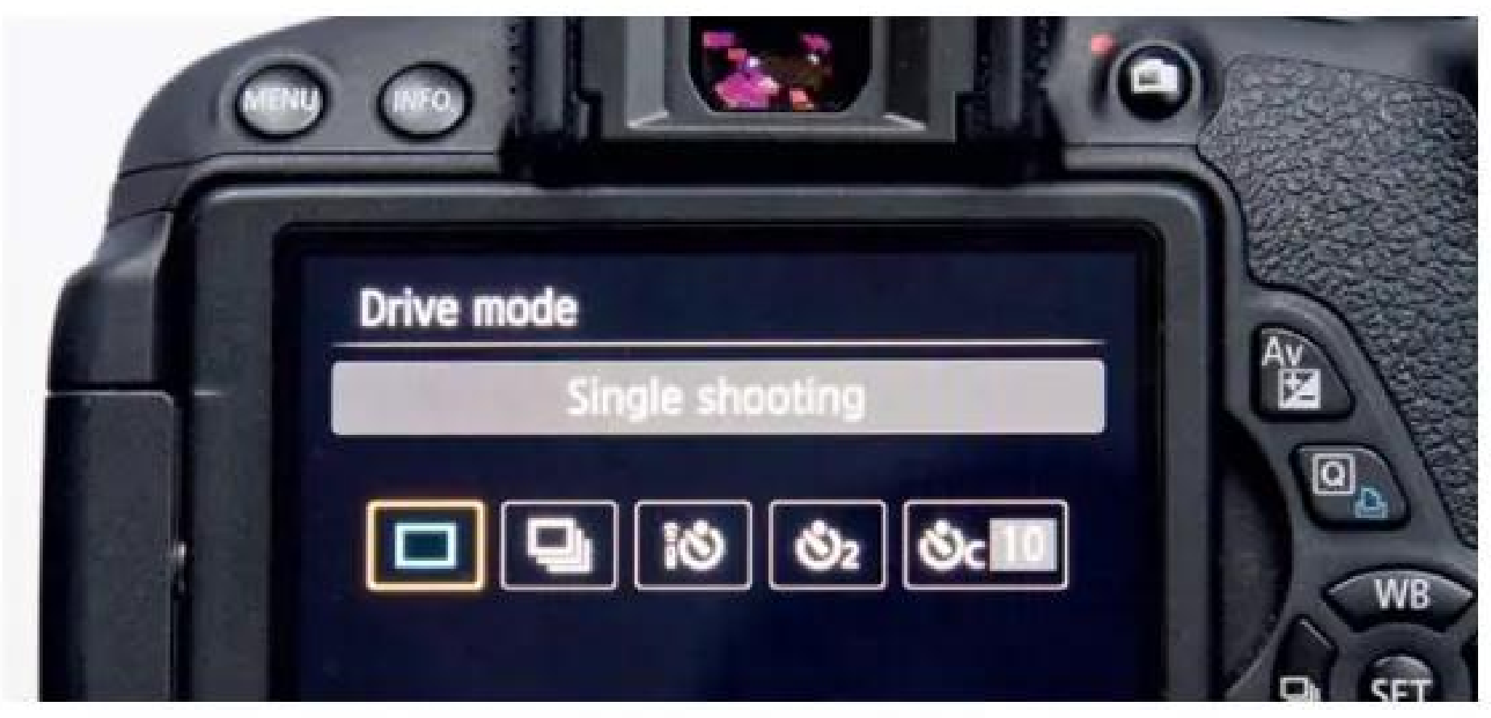
FREE ON FILESILO

When you see this graphic there's a video on FileSilo

See page 194 for more

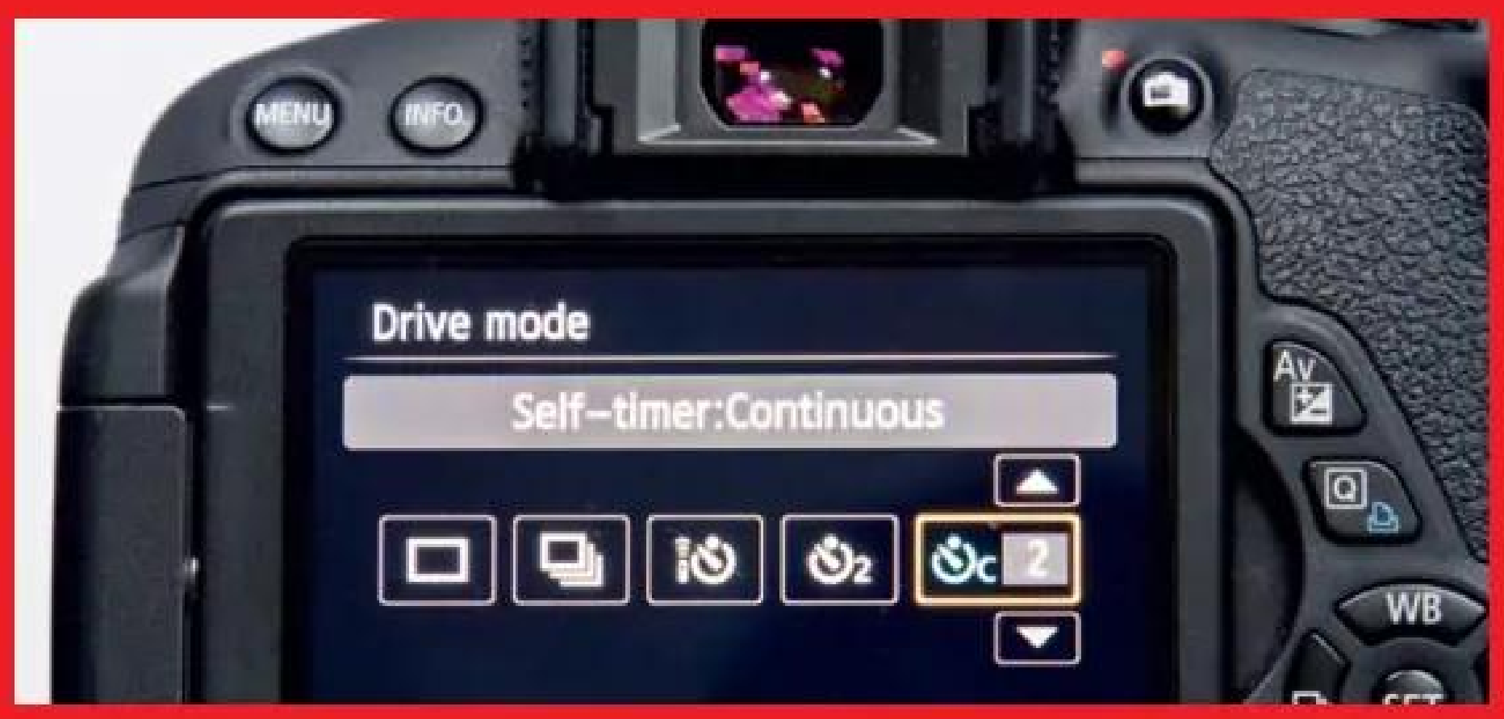
Ready, steady, shoot!

Match the drive mode to the subject matter for more successful photo shoots


MENU
INFO
Drive mode
Single shooting
WB
SET

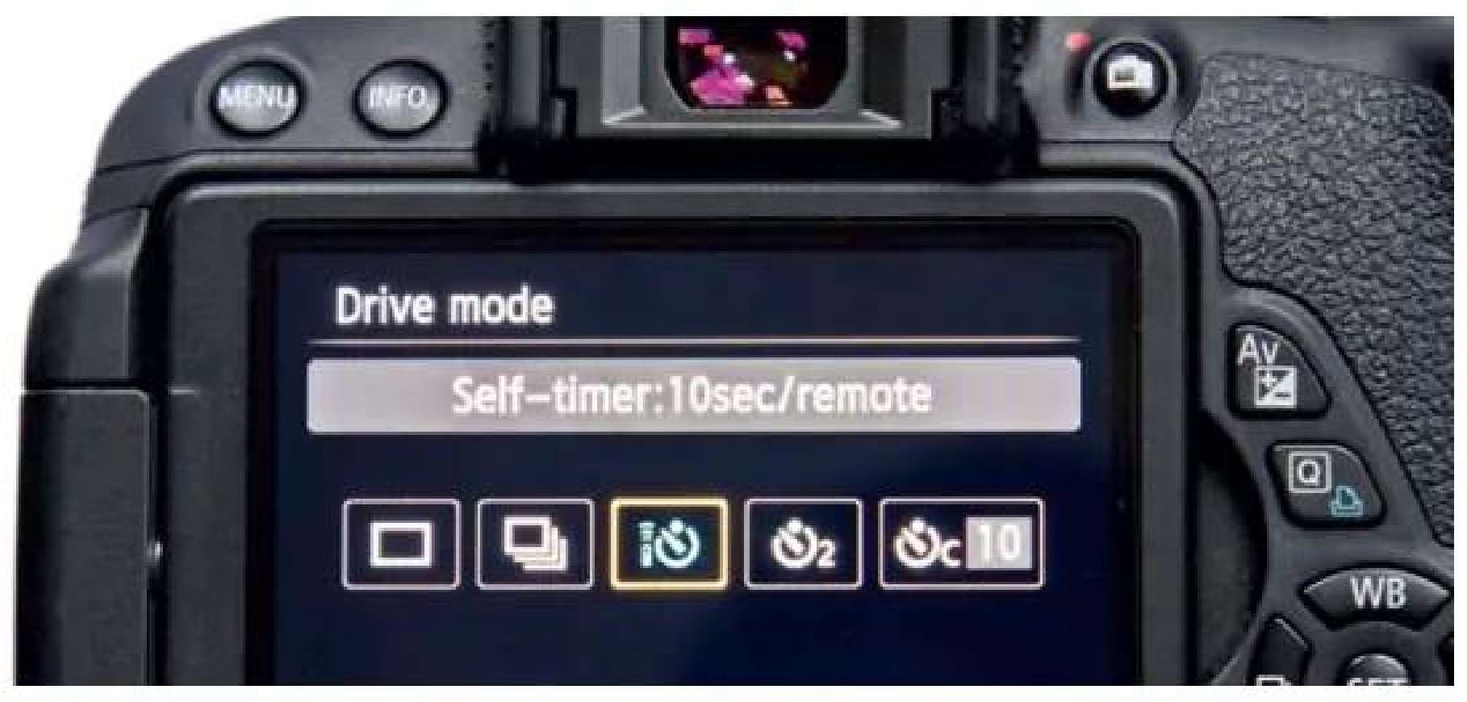
Single shot

The first setting on the list is Single Shot, which you'll use the majority of the time. Your camera will take one photo when you press the shutter release. To take another shot, release your finger from the shutter, then press down again. Your camera will meter the scene and refocus.


MENU
INFO
Drive mode
Self-timer:Continuous
WB

Self-timer continuous

There's also an option called Self Timer Continuous. With this mode you can key in how many images you want your camera to shoot once the shutter is triggered. Most models are capable of firing between two and ten shots in this mode.


MENU
INFO
Drive mode
Self-timer:10sec/remote
WB

Self-timer

There's also the Self Timer setting in the Drive mode menu, which is good for taking a self portrait or for those group shots where you need to run in! You have two options to choose from, which are a two-second or a ten-second delay.

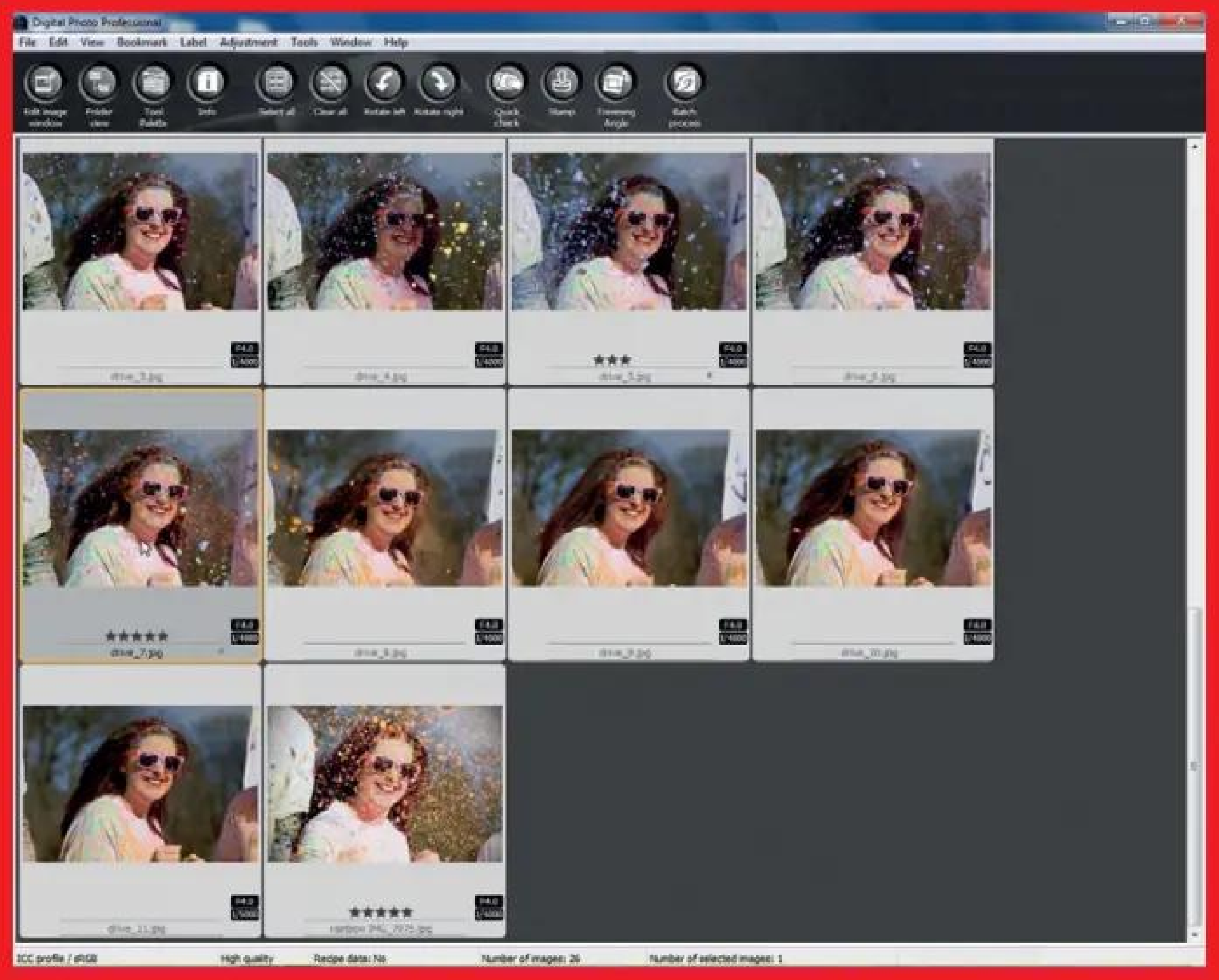
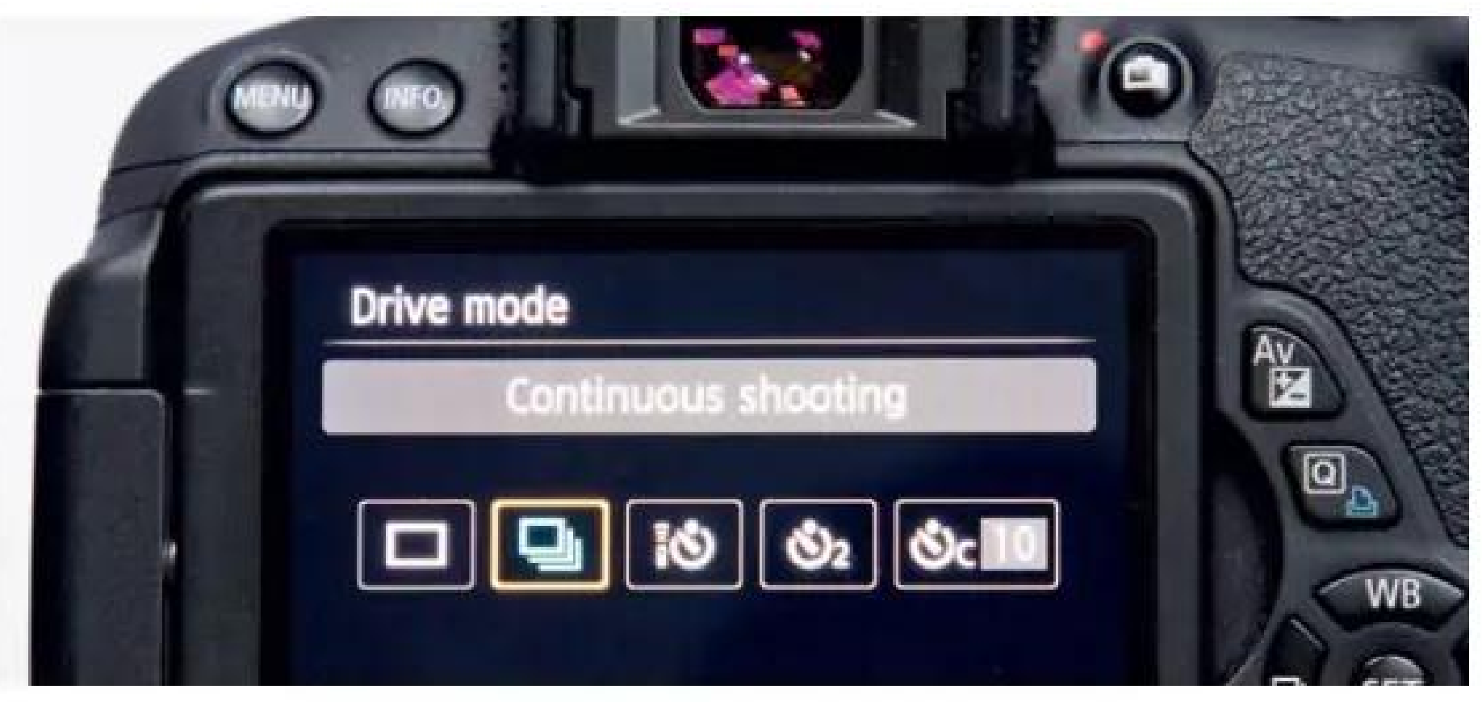


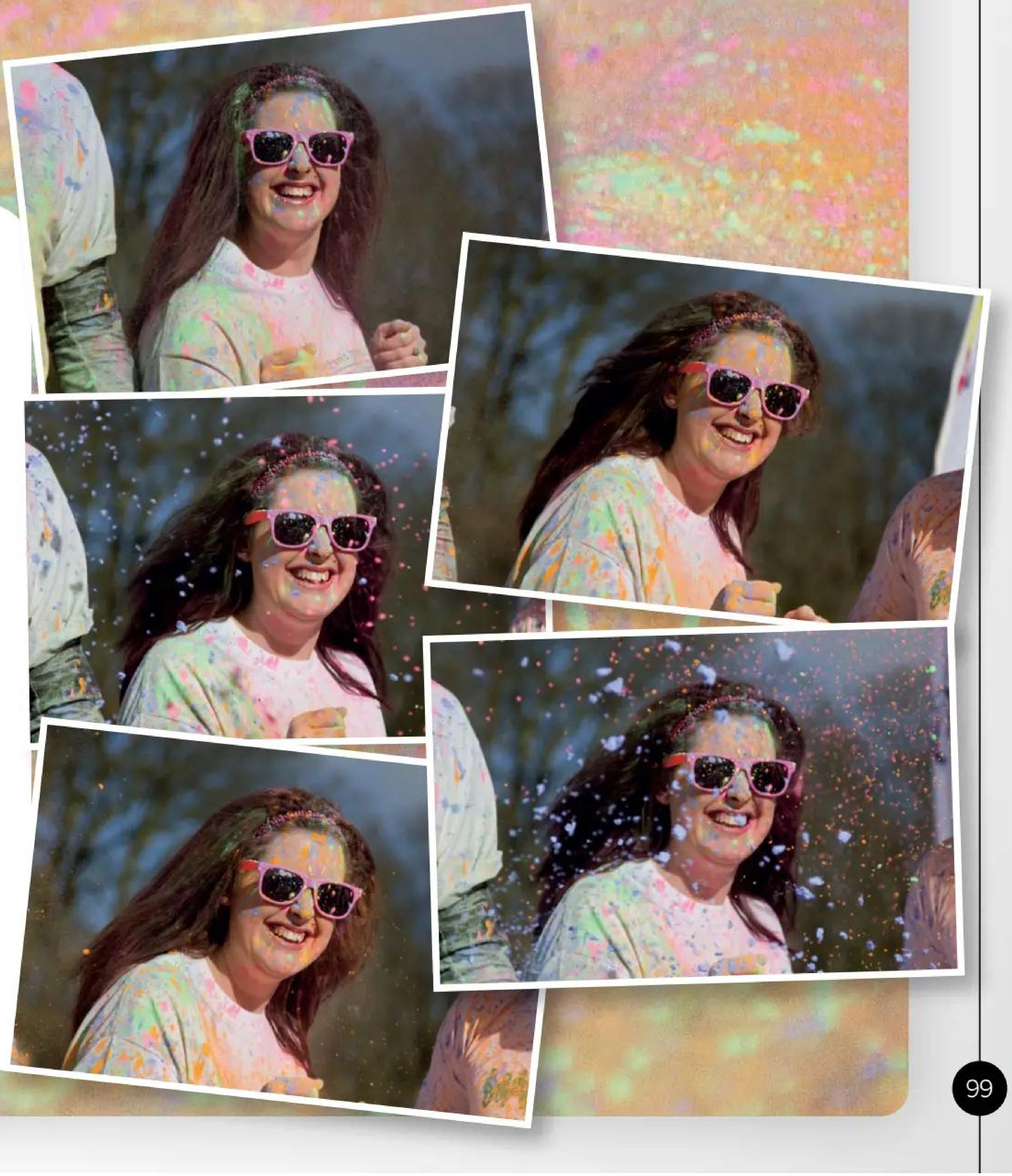
Image processing

Remember that the more you shoot, the more you have to edit. Shooting continuously doesn't guarantee great results in every shot, but the idea is to try to get one or two decent images from the stack. You can use a software editing package such as the free Canon Digital Photo Professional (included on the disc in the camera box), to sort and rate your photographs.



Burst mode

The second most useful mode is Continuous Shooting. How fast your camera can capture a succession of shots is determined by a few factors. First, the camera model, because each varies in specification. If, for example, your camera can shoot at five frames per second, that means for every second you have your finger down on the shutter, it will take five photos. However, it can't do this indefinitely, and there are other factors to consider. These include the image quality and size, and the memory card capacity and writing speed.



Gym
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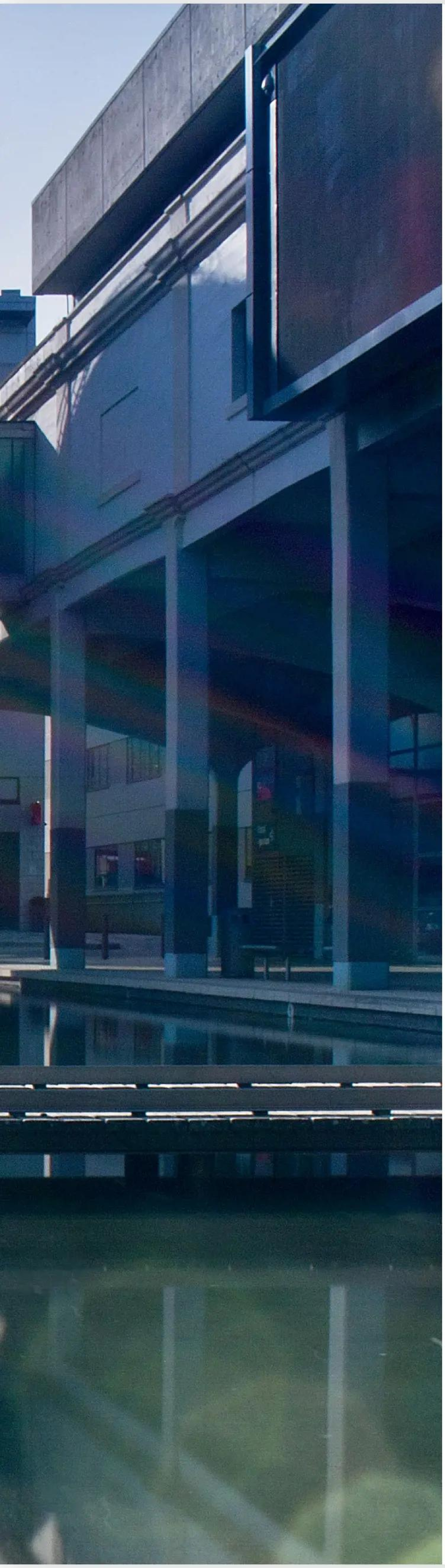
Toi
ZEN



White balance

Capture perfect colours using a custom white balance setting

You may think that the colours you can see are what you're going to capture in your camera. This isn't always the case, however. Unlike your eye, which can compensate for colour casts, your camera can only record what is actually there. For this reason your DSLR has a white balance setting. For the majority of the time we recommend that you keep your camera on the automatic white balance setting, and only change it if your camera struggles to capture the correct colours. To alter the white balance you must be in one of the creative shooting modes, namely program, aperture priority, shutter priority or manual.

What is white balance?

Every light produces a colour temperature. Daylight is different to a household lamp, and a fluorescent strip light, and a flash light. The setting works by adding another colour to remove the cast being created by the ambient light. The aim is to get a result where the scene appears neutral, as the eye would perceive it.

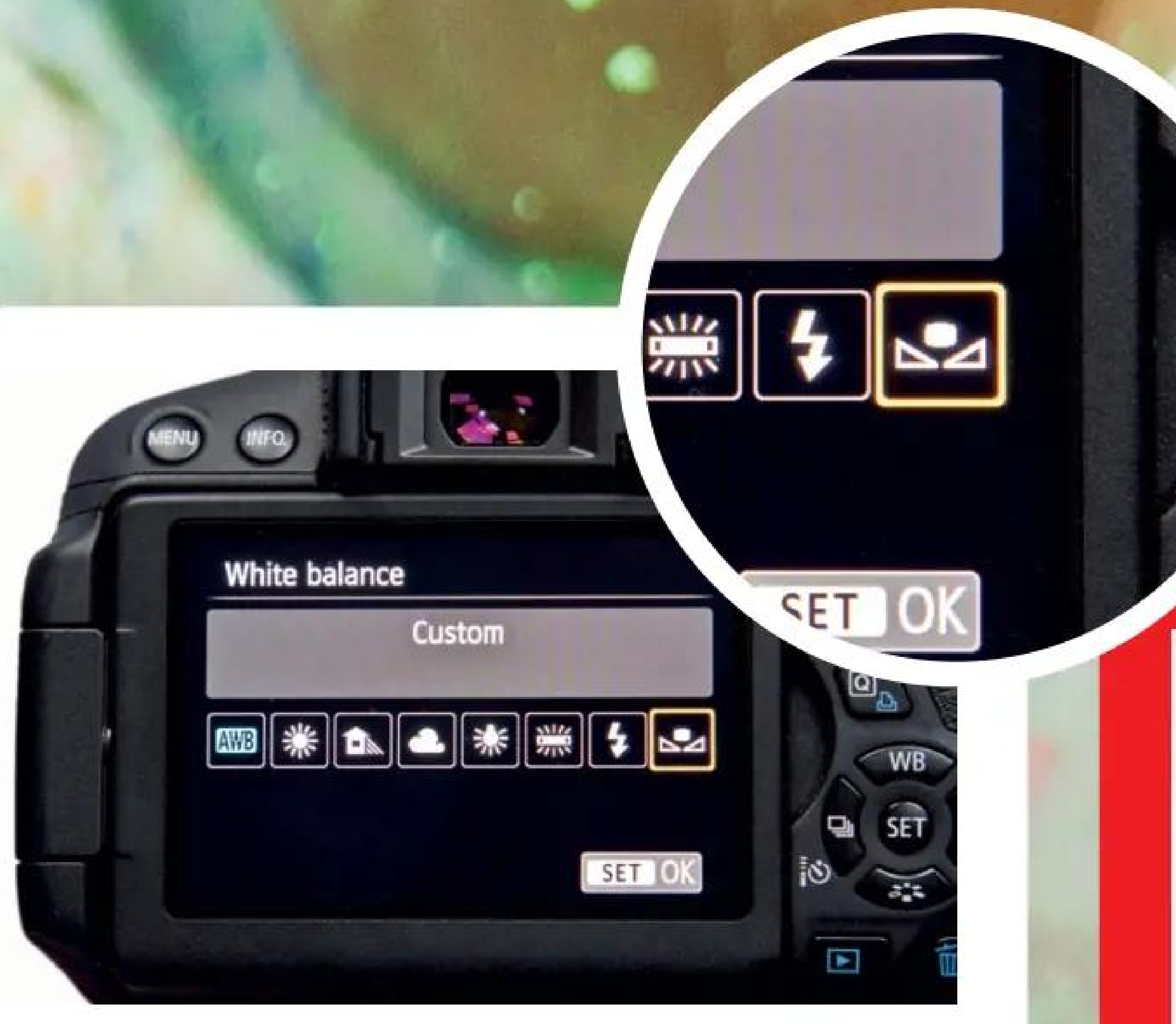
The colour temperature chart

Photographers measure light temperature in degrees Kelvin. Here are the main settings and the temperature they output…

Light	Temperature (degrees Kelvin)
Shade	7000K
Cloudy	6000K
Daylight	5200K
Flash	4500K
Fluorescent	4200K
Tungsten	3200K

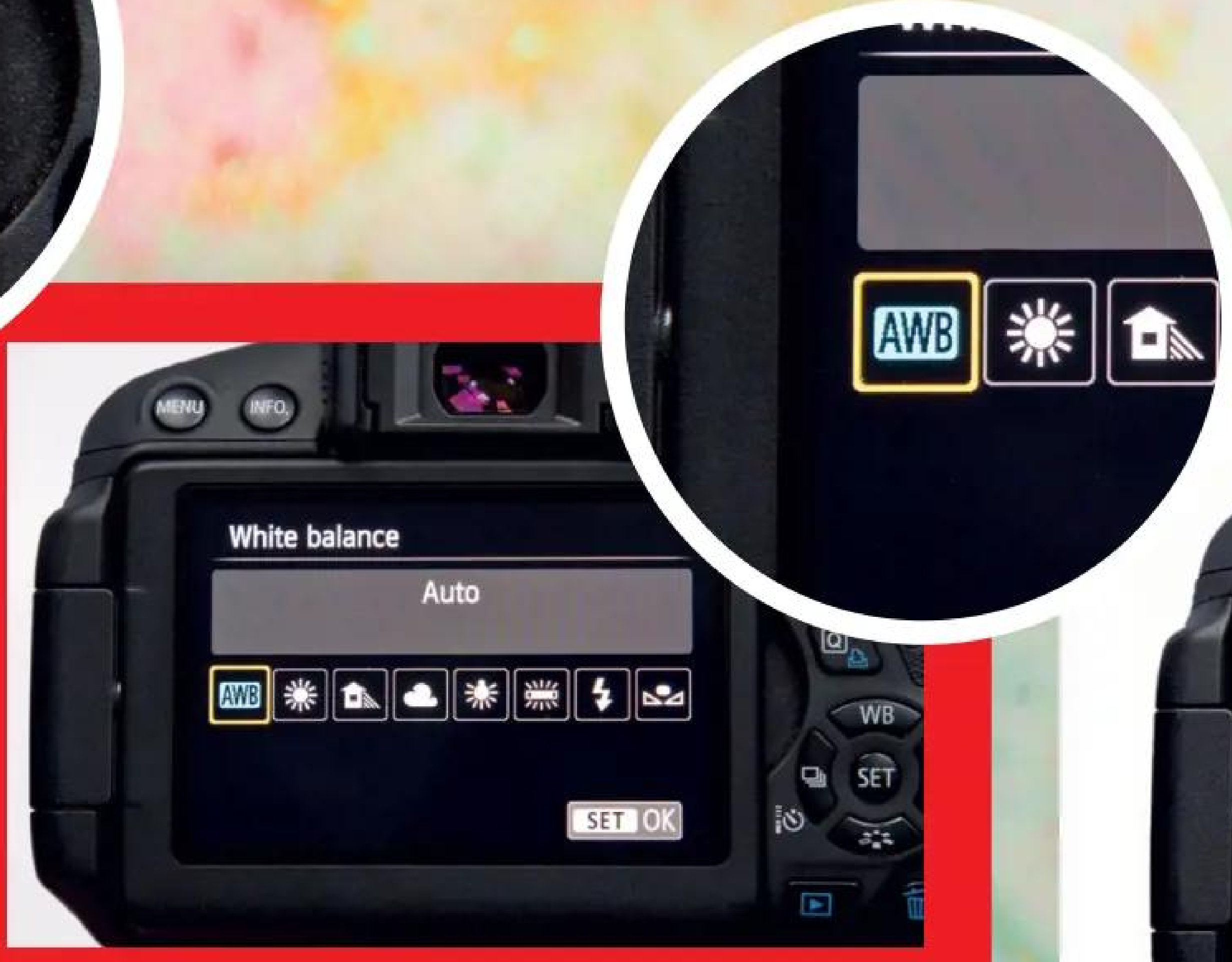
White balance settings

Find out how to adjust the white balance to remove undesirable colour casts


MENU
INFO
White balance
Custom
SET OK
WB
SET

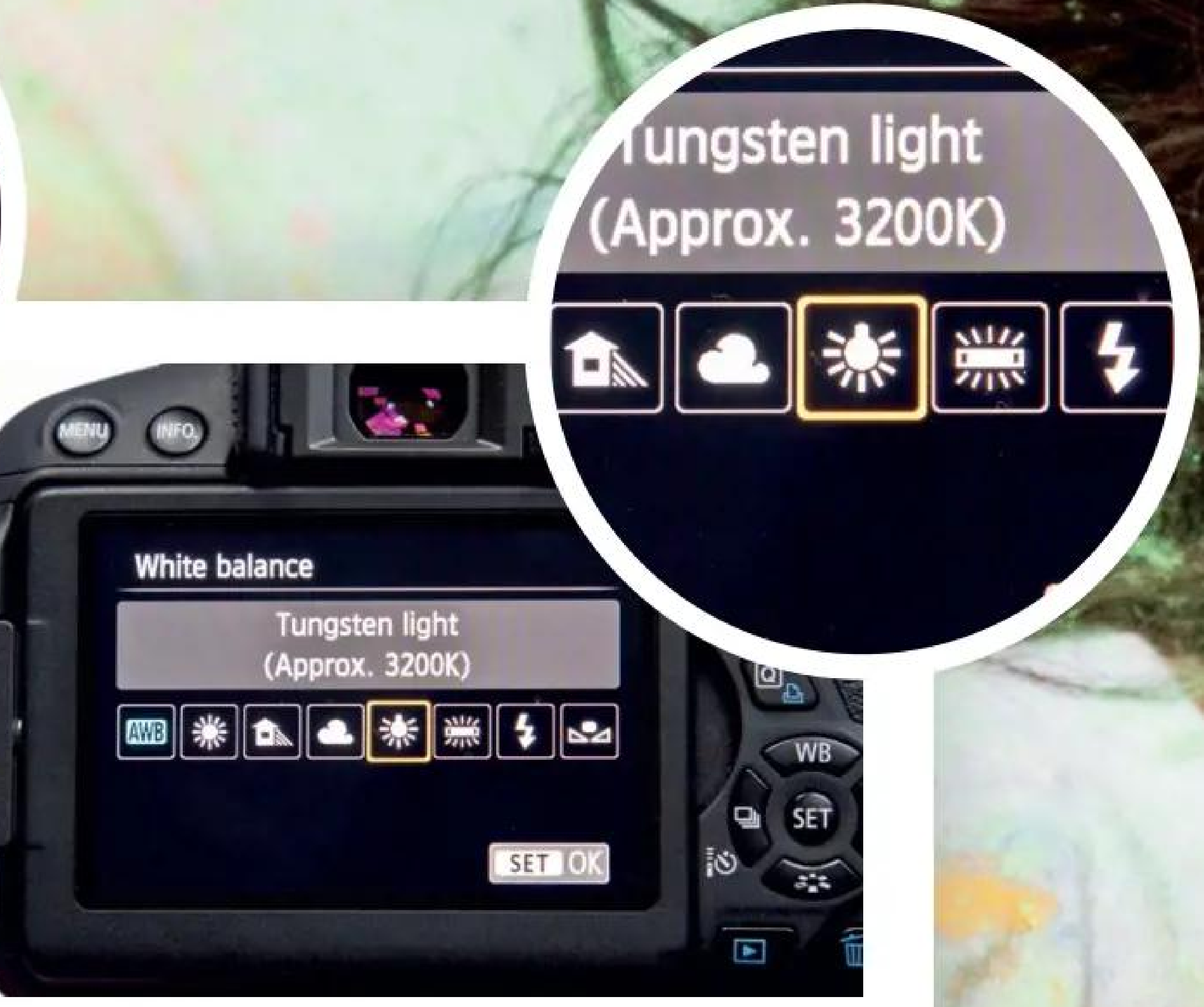
Custom white balance

The custom white balance setting is useful when you're shooting under a consistent light source such as in a studio. To use the custom setting, first take a photo of something white under the ambient light. This could be a piece of paper or card. Then press the Menu button and in the camera settings select Custom White balance. It will then use that image to work out the white balance temperature setting of the scene. This will then be assigned to the Custom setting in the white balance menu.


MENU
INFO
White balance
Auto
AWB
SET OK
WB
SET

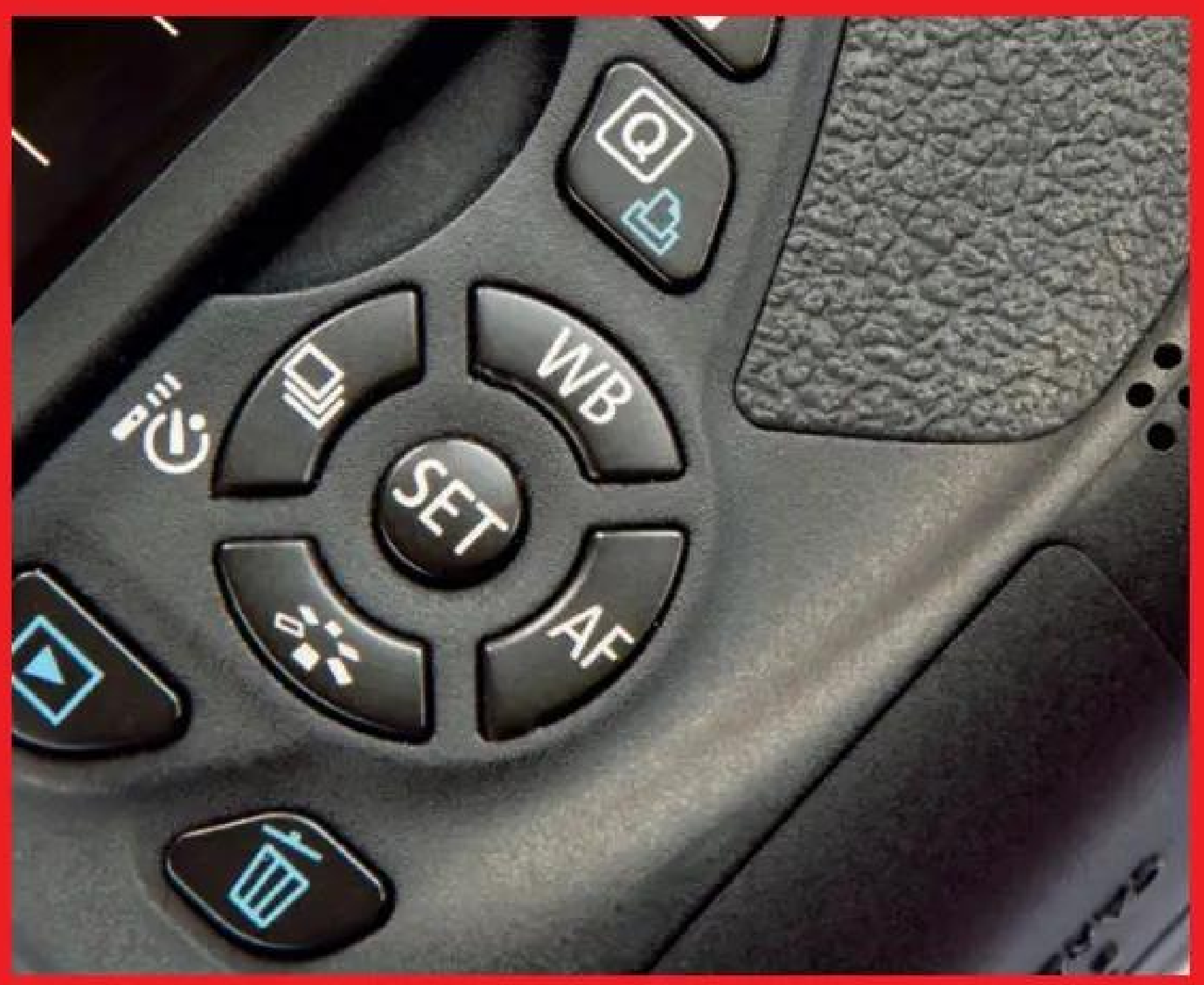
Auto white balance

The WB menu has eight options to choose from, and the first in the list is Auto White Balance. This is because for the majority of the time, this is the one you'll use the most. Your camera will guess what it thinks is the correct setting given the conditions. But there will be times when it struggles to get it right, and when this happens, you need to take control.


Tungsten light
(Approx. 3200K)
MENU
INFO
White balance
Tungsten light
(Approx. 3200K)
AWB
SET OK
WB
SET

Tungsten light

The Tungsten setting is worth highlighting, because this term isn't such a familiar one. Tungsten light has a very orange cast, and is produced by household lamps. By selecting this light bulb symbol the camera will blast in a blue colour cast to neutralise the orange cast created by the light source.



Set the white balance

The white balance button is marked WB. If you have a beginner model you'll find it on the back panel in the bottom left-hand corner. If you own an enthusiast or pro model, the button is on the top panel. Press it to engage and then use the command dial to alter the setting.

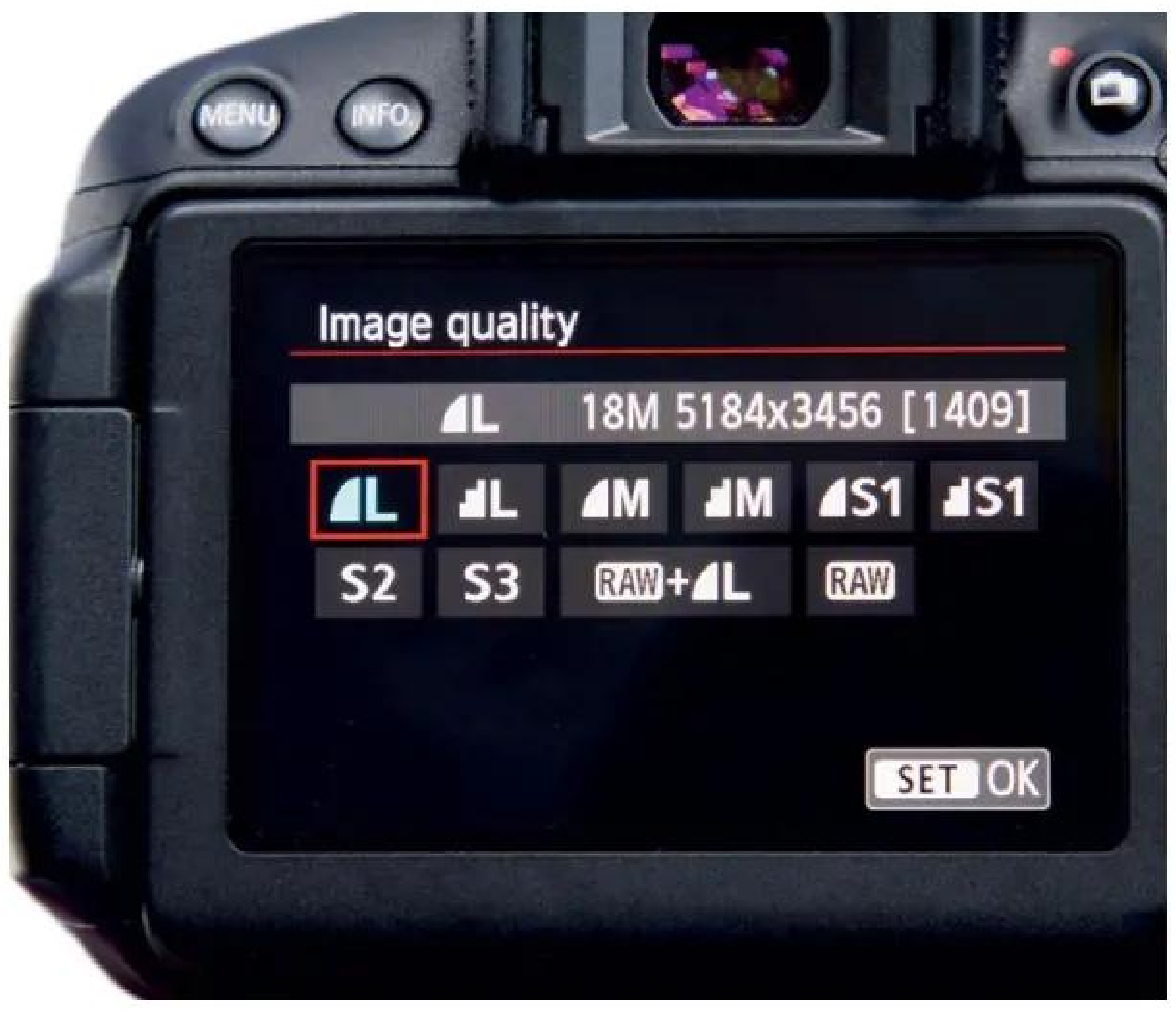


Image quality
L 18M 5184x3456 [1409]

Raw and JPEG

If you shoot in raw mode then you can adjust the white balance at the editing stage. If you're only shooting JPEGs then you can't adjust the setting later on, so always make sure you set the white balance back to the automatic setting after you've finished your shoot. The effect will carry on being applied to all further images even if you've turned your camera off between shoots.

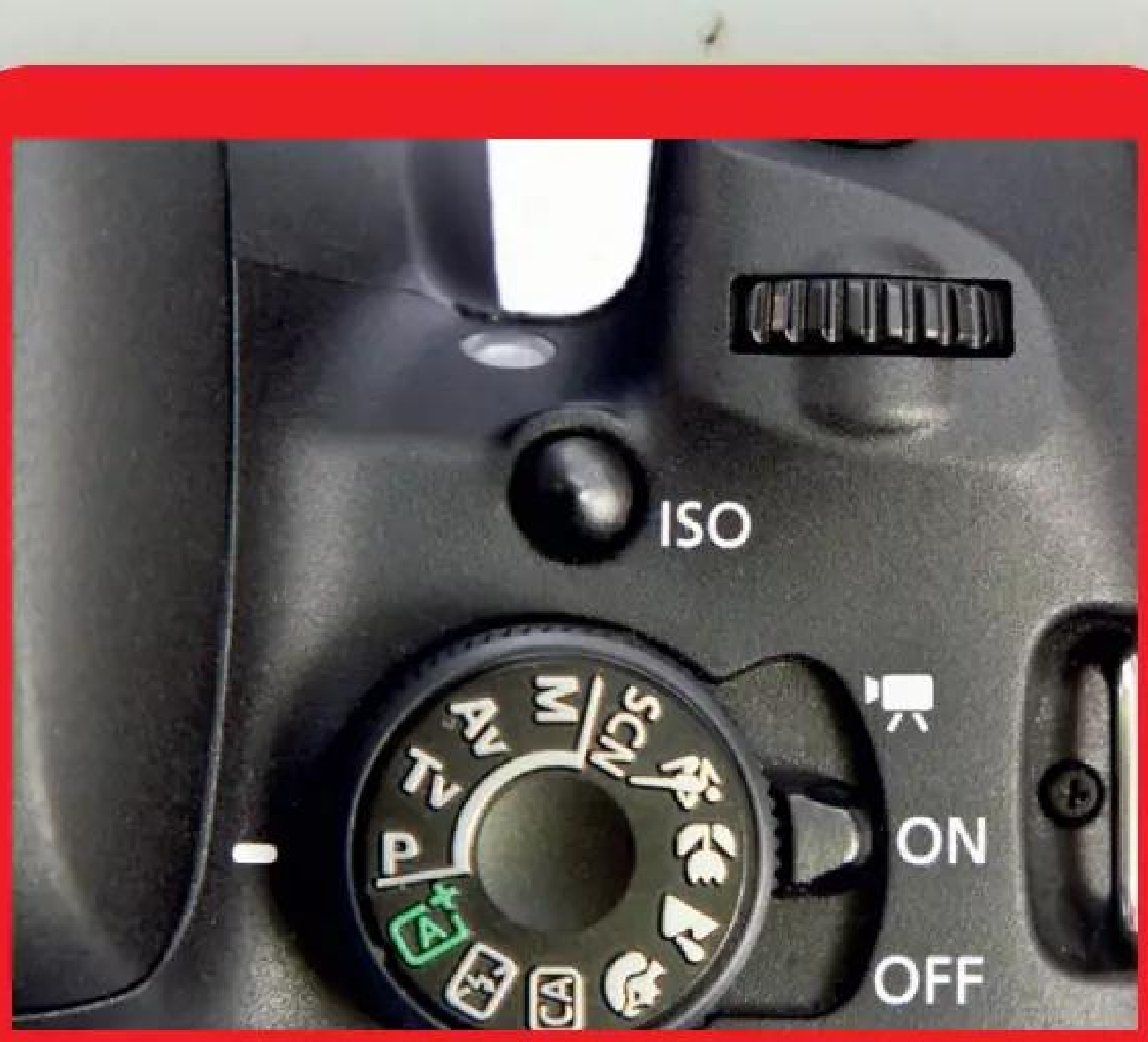
ISO sensitivity

Adjust the ISO to get better exposures in any lighting conditions

ISO controls the sensitivity of the DSLR’s sensor to the light, and is the third element of the ‘exposure triangle’ along with shutter speed and aperture. We use low ISO settings when we’re shooting in bright light, and we increase the setting the more the light drops. This is basically so we can keep the shutter speed at a fast enough setting. If you’re shooting with your camera attached to a tripod, and a slow shutter speed setting isn’t an issue, keep the ISO as low as possible. Only increase the ISO when you need to adjust your other camera settings. ISO is a key feature on your DSLR, and one you need to fully understand to take better photographs. Turn the page to find out more… ▶

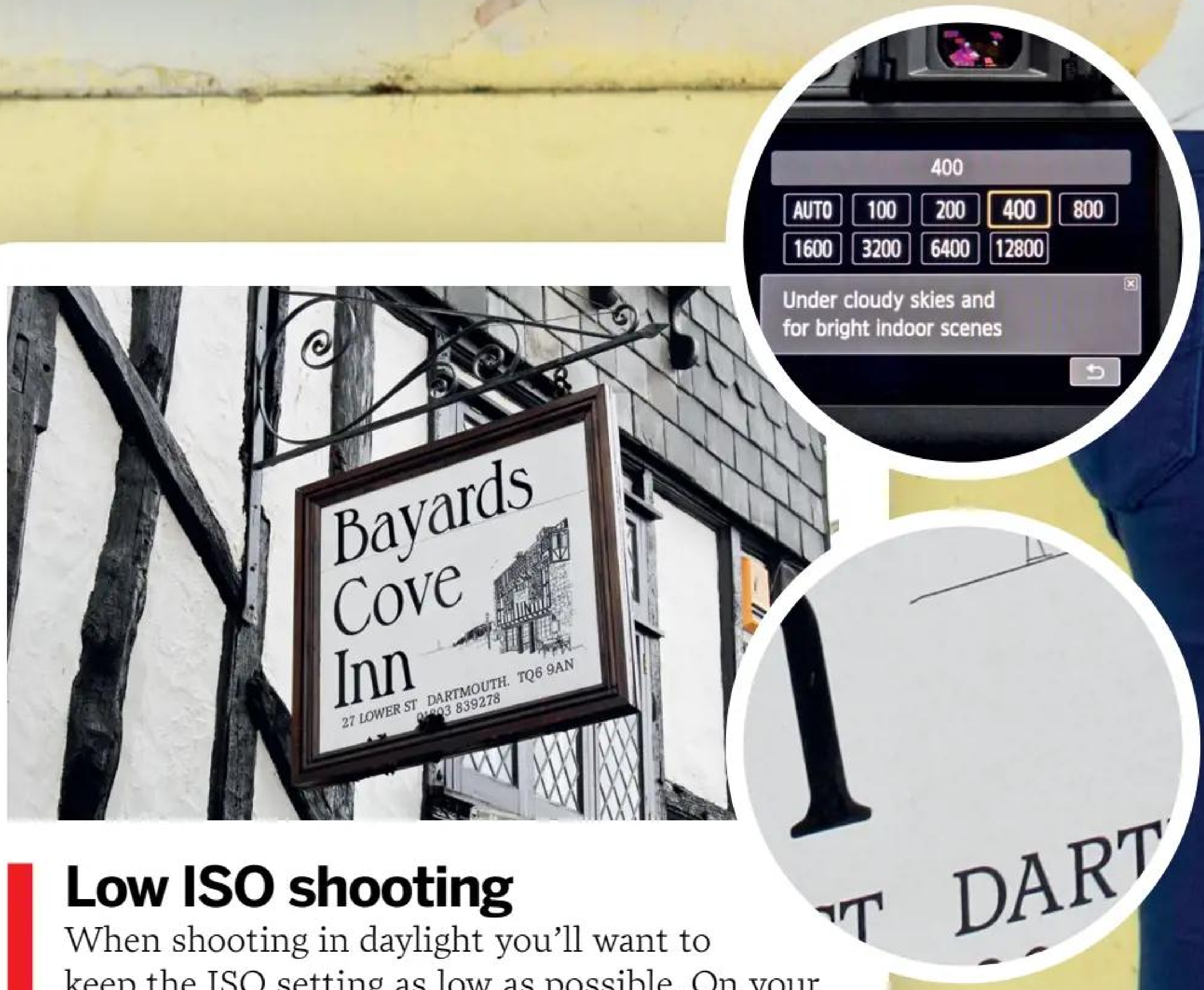
How to choose the ISO

Take better pictures using the appropriate ISO setting



How to adjust the ISO

There are a couple of ways to adjust the ISO on your DSLR. You can either look for an ISO button on the top panel of the camera or use the Q button and navigate to the setting on the LCD screen. A typical range will start at ISO100 and will go up to ISO6400 or 12800.

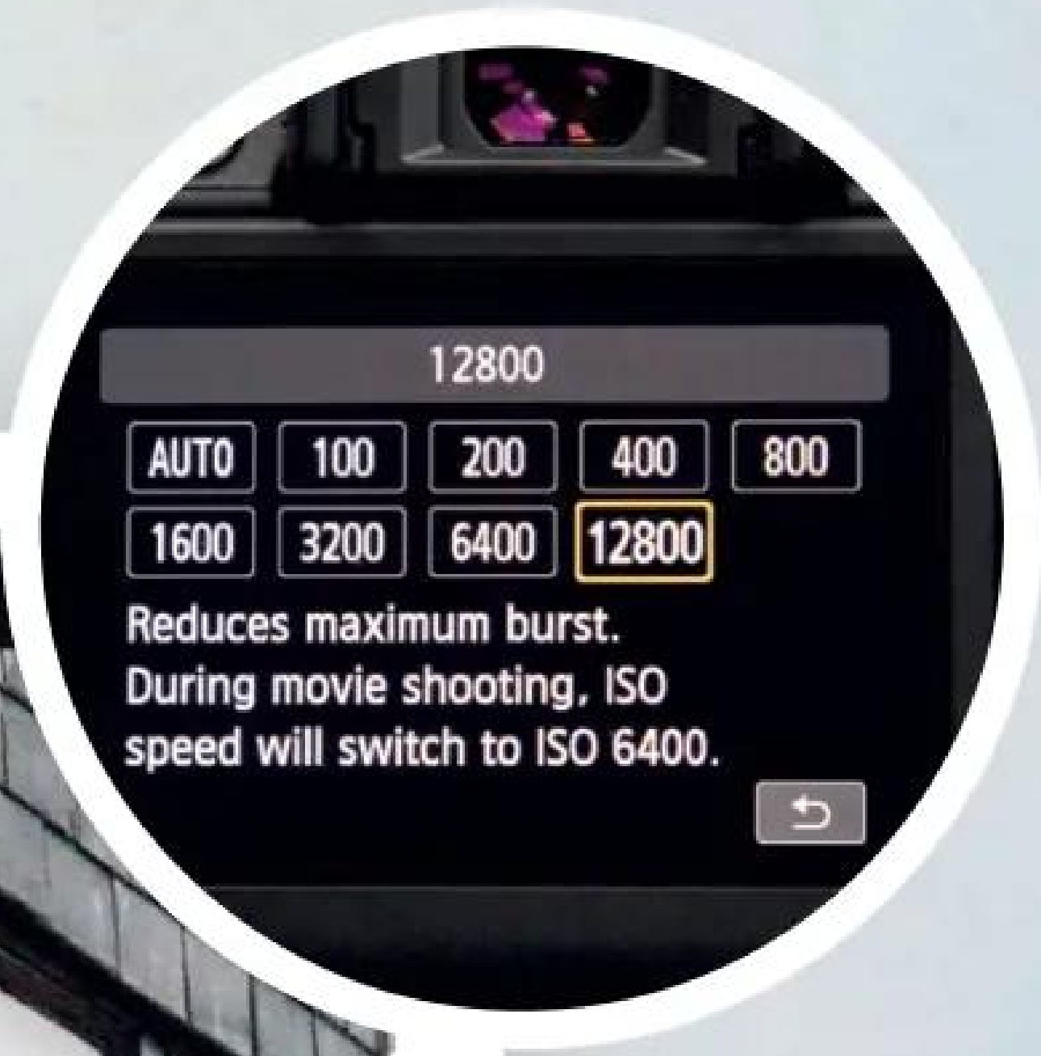

400

AUTO 100 200 400 800
1600 3200 6400 12800

Under cloudy skies and for bright indoor scenes

Low ISO shooting

When shooting in daylight you'll want to keep the ISO setting as low as possible. On your Canon camera the optimum ISO setting is 100. When shooting at this setting your camera will produce the highest quality results possible. If you're taking photos on an overcast day, you may need to push the ISO up to 400 to compensate for the lack of light.



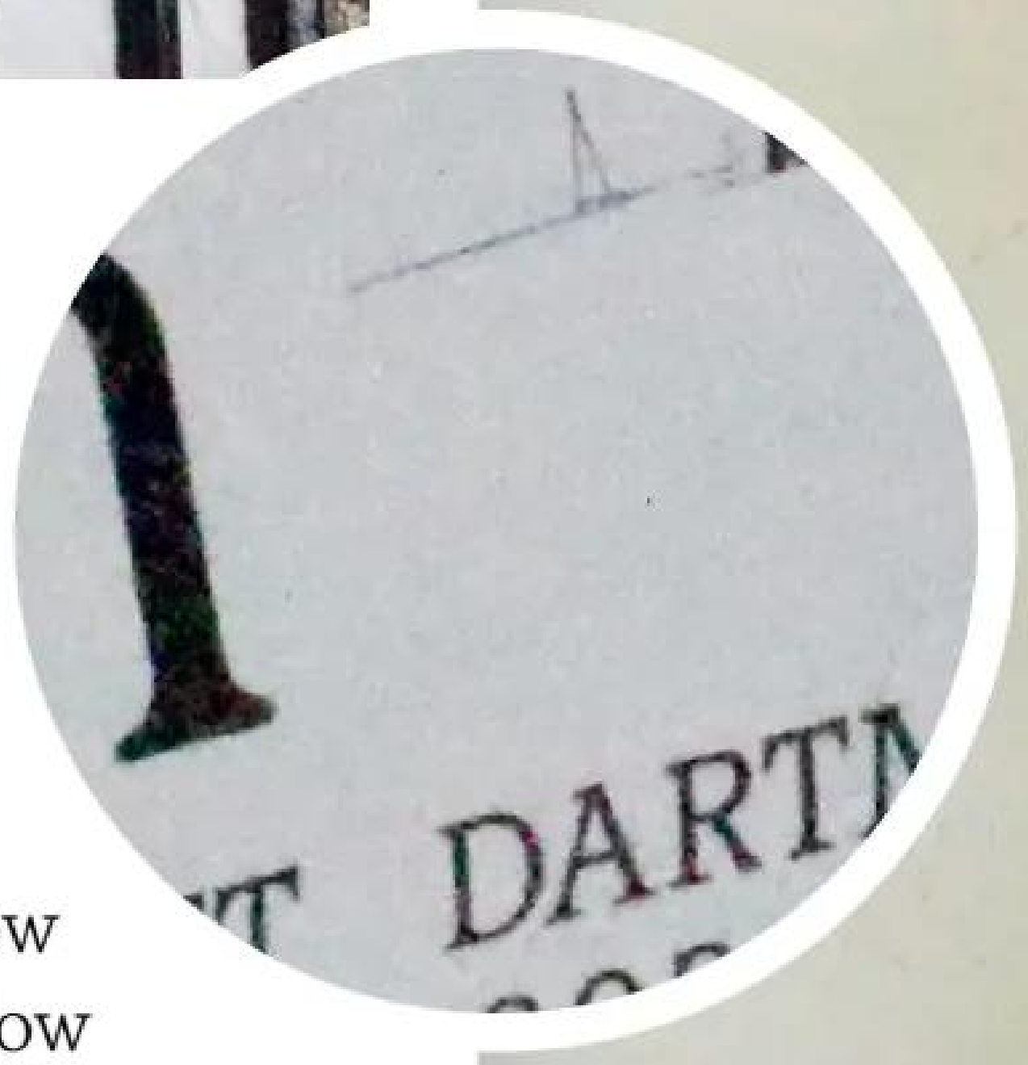
12800

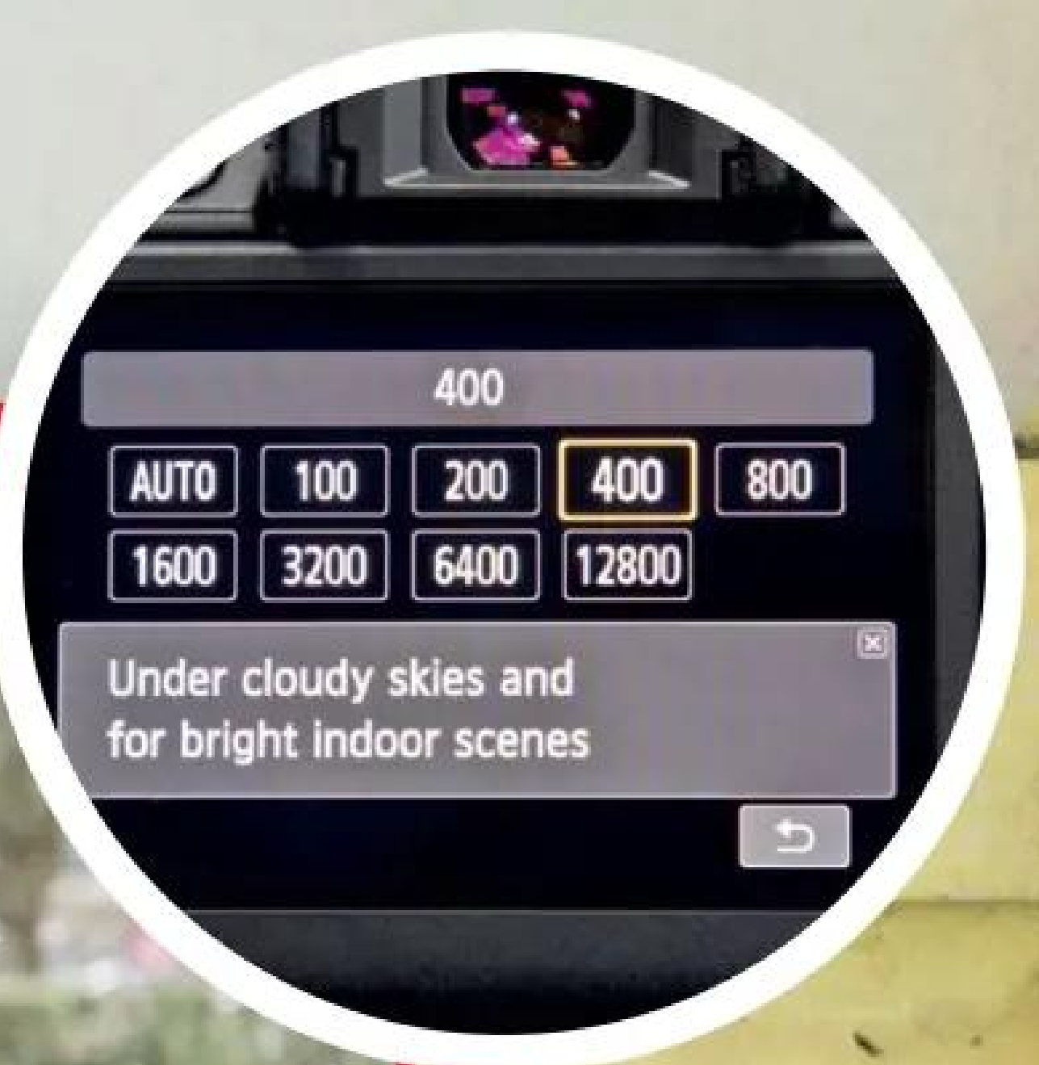
Reduces maximum burst.
During movie shooting, ISO speed will switch to ISO 6400.

Bayards Cove Inn
27 LOWER ST DARTMOUTH. TQ6 9AN

High ISO shooting

You should use high ISO settings when you need to increase your shutter speed setting in low light. It's important to know that the more you increase the ISO setting, the more the image quality deteriorates. Photographers call this 'noise', and it looks like small specks of grain in the image. It's a game of compromise between keeping the ISO as low as possible, and avoiding camera shake caused by slow shutter speeds.





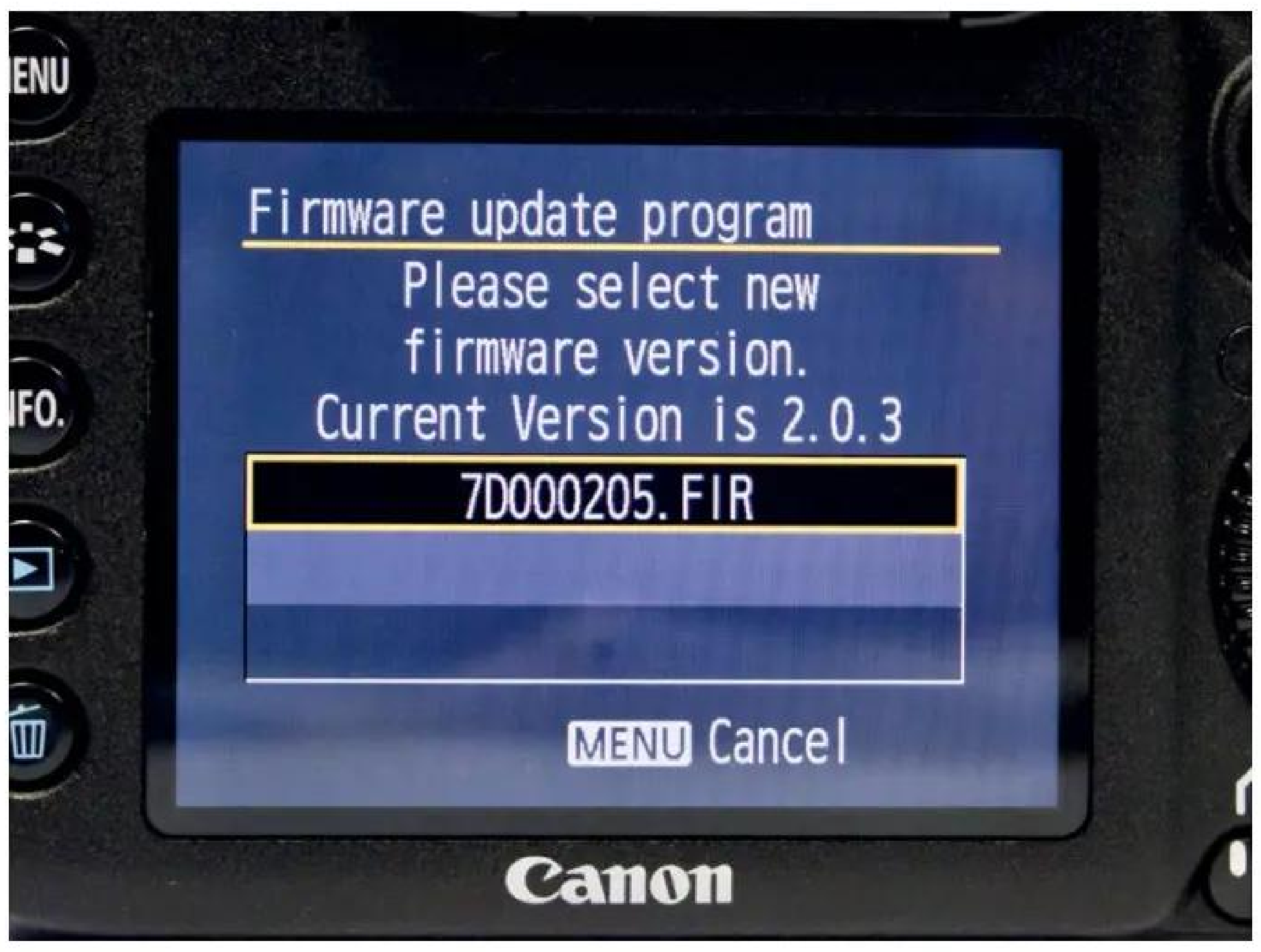
400

Under cloudy skies and for bright indoor scenes

How it works in practice

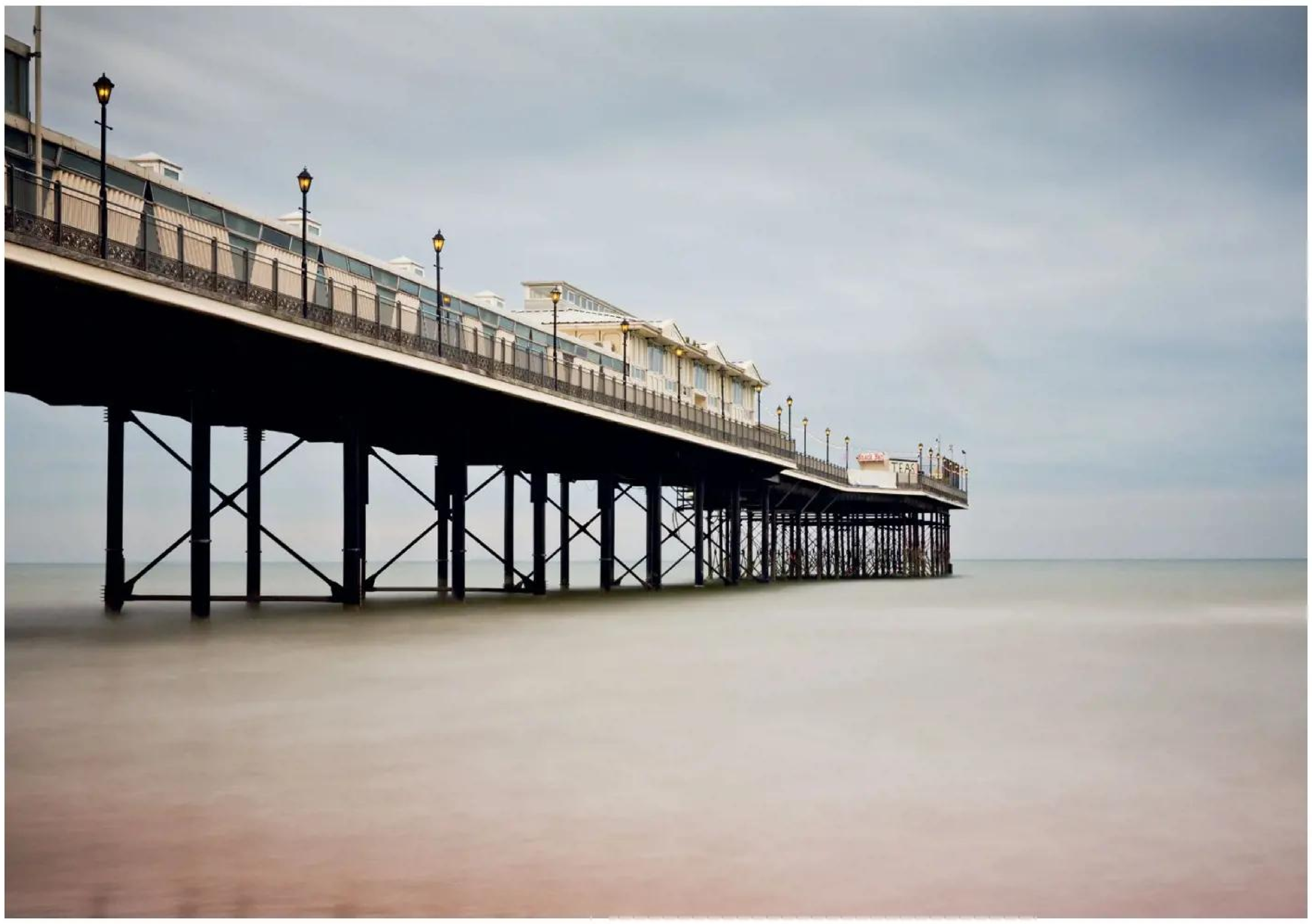
Let's take a look at a shooting scenario and how we can use ISO to help us get the best results. Say we're taking a portrait and we want the aperture setting to be f/4. The ISO is set to 100, and in the ambient light conditions the shutter speed setting is 1/30 sec. What's the issue here? The shutter speed is too slow to shoot with the camera handheld. So what we can do is push the ISO up to ISO400, which is a two-stop difference. This means that now in the ambient light conditions the shutter speed setting will be 1/125 sec, which is fast enough to shoot by hand.

ISO
SCN
M
Av
Tv
P
ON
OFF



Firmware update program
Please select new
firmware version.
Current Version is 2.0.3
7D000205.FIR

MENU Cancel
Canon



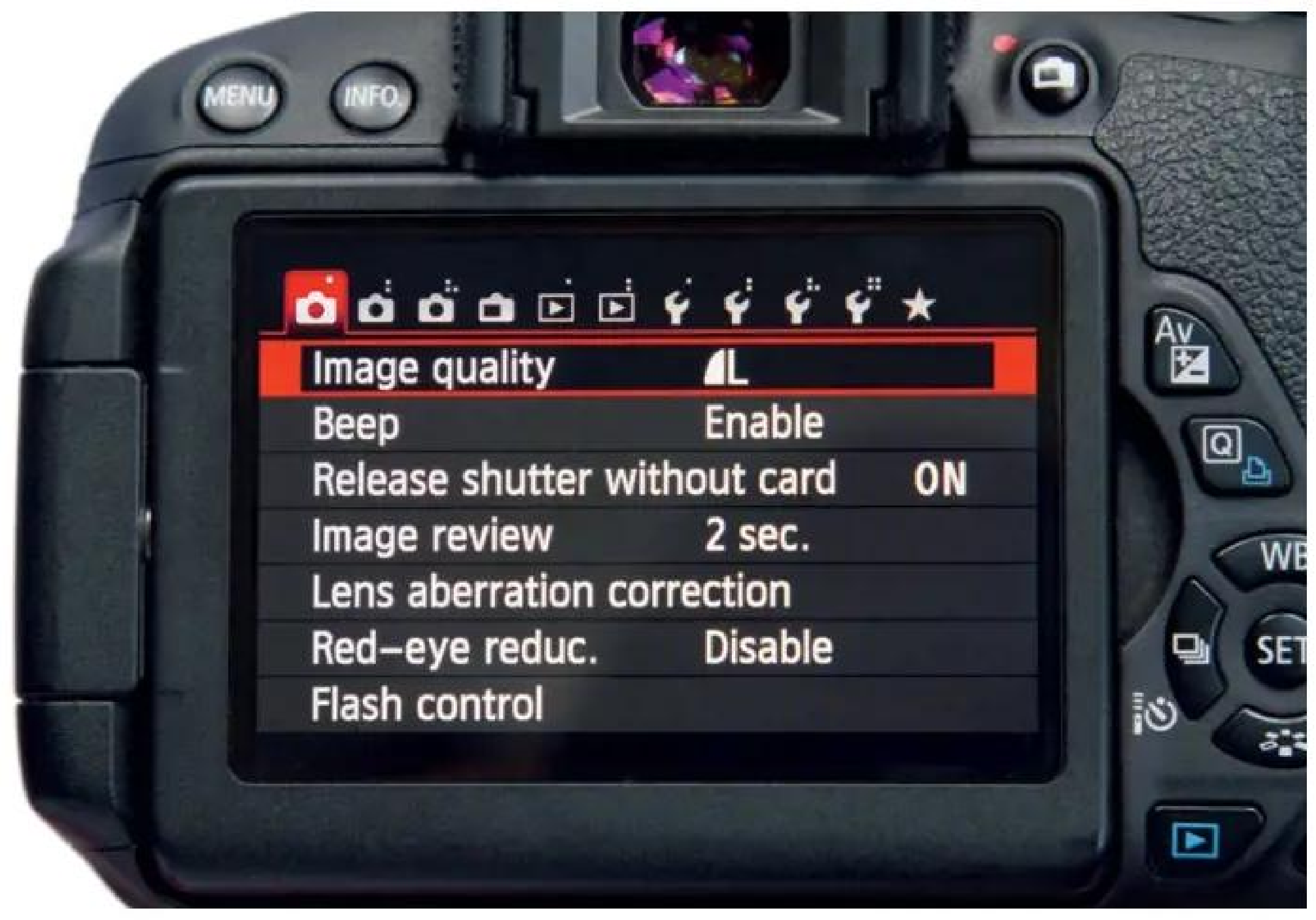
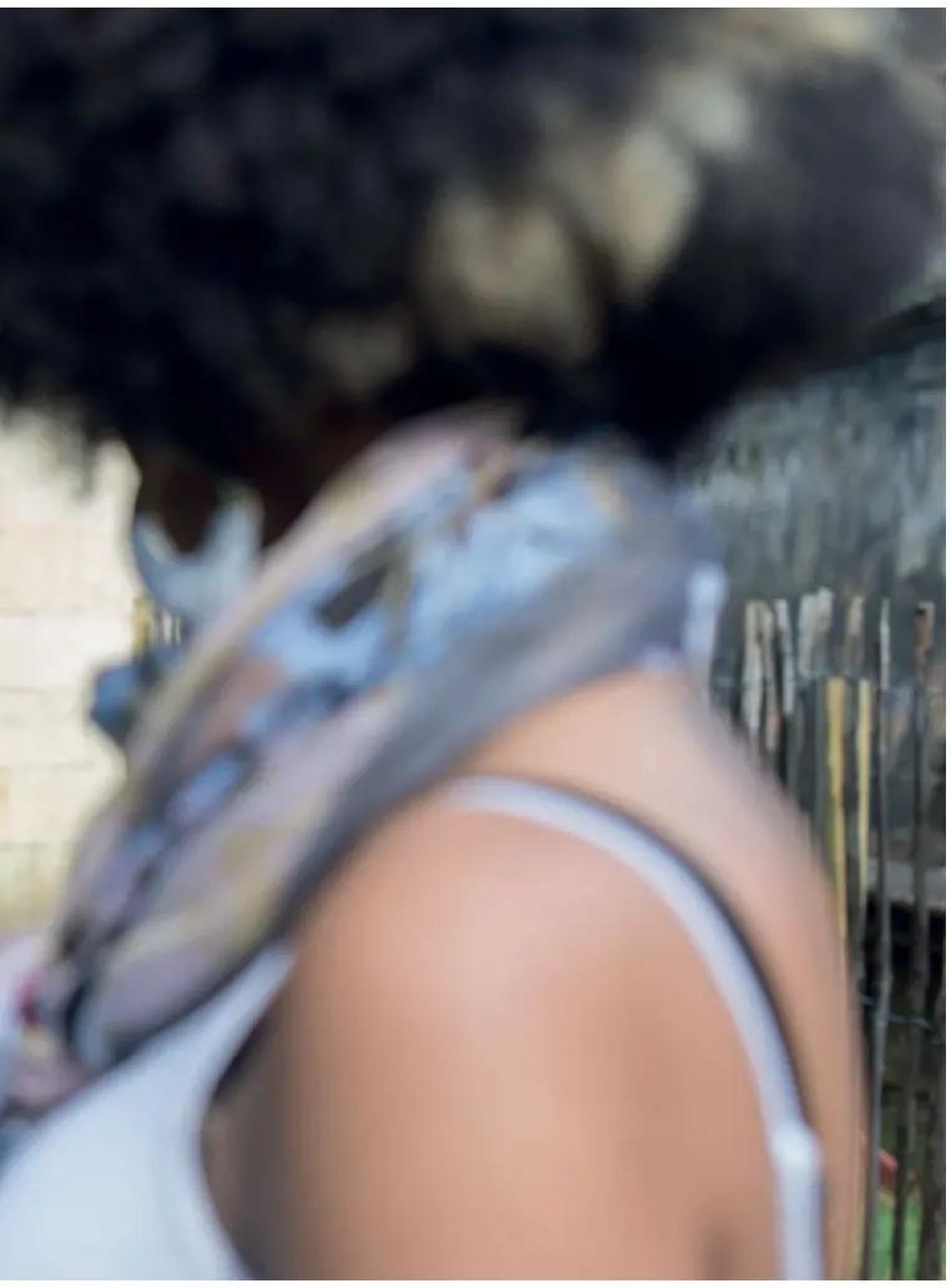

MENU
INFO.

Image quality ◢L
Beep Enable
Release shutter without card ON
Image review 2 sec.
Lens aberration correction
Red-eye reduc. Disable
Flash control

SET

Q
WB
SET
AF
RAW+L
[325]



Advanced SLR features

Optimise your Canon DSLR with customised presets, settings, menu items and more

110 **Improve your images with Picture Styles**
Customise a photo's saturation, contrast and more with a camera Picture Style

116 **Take better photos with fill-in flash**
Enhance your portraits by eliminating harsh shadows using your DSLR's built-in flash

120 **Bracket your exposures**
Use the AEB feature to take three different exposures of the same scene

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Use Bulb mode to manually control the duration of an exposure

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Capture both the highlights and shadows in a high-contrast scene

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Keep your camera up to date by updating it with the latest firmware download

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Put all your favourite settings in one place with the My Menu feature

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Discover how to customise your Canon digital SLR's interface to suit your shooting style

Use Picture Styles

Customise a photo's saturation, contrast and more with a camera Picture Style

A Picture Style is an image effect applied in the camera that enhances the final image. Essentially, it works by adjusting a few different aspects, such as the sharpness, saturation, and contrast to create different renderings.

The Picture Style is applied directly to the JPEG image, but if you're shooting in raw, you can preview the effect in-camera. It's worth noting that the effects won't be saved in the raw file unless you open the file in Canon's free Digital Photo Professional software. Then the Picture Style setting will be recognised and applied.

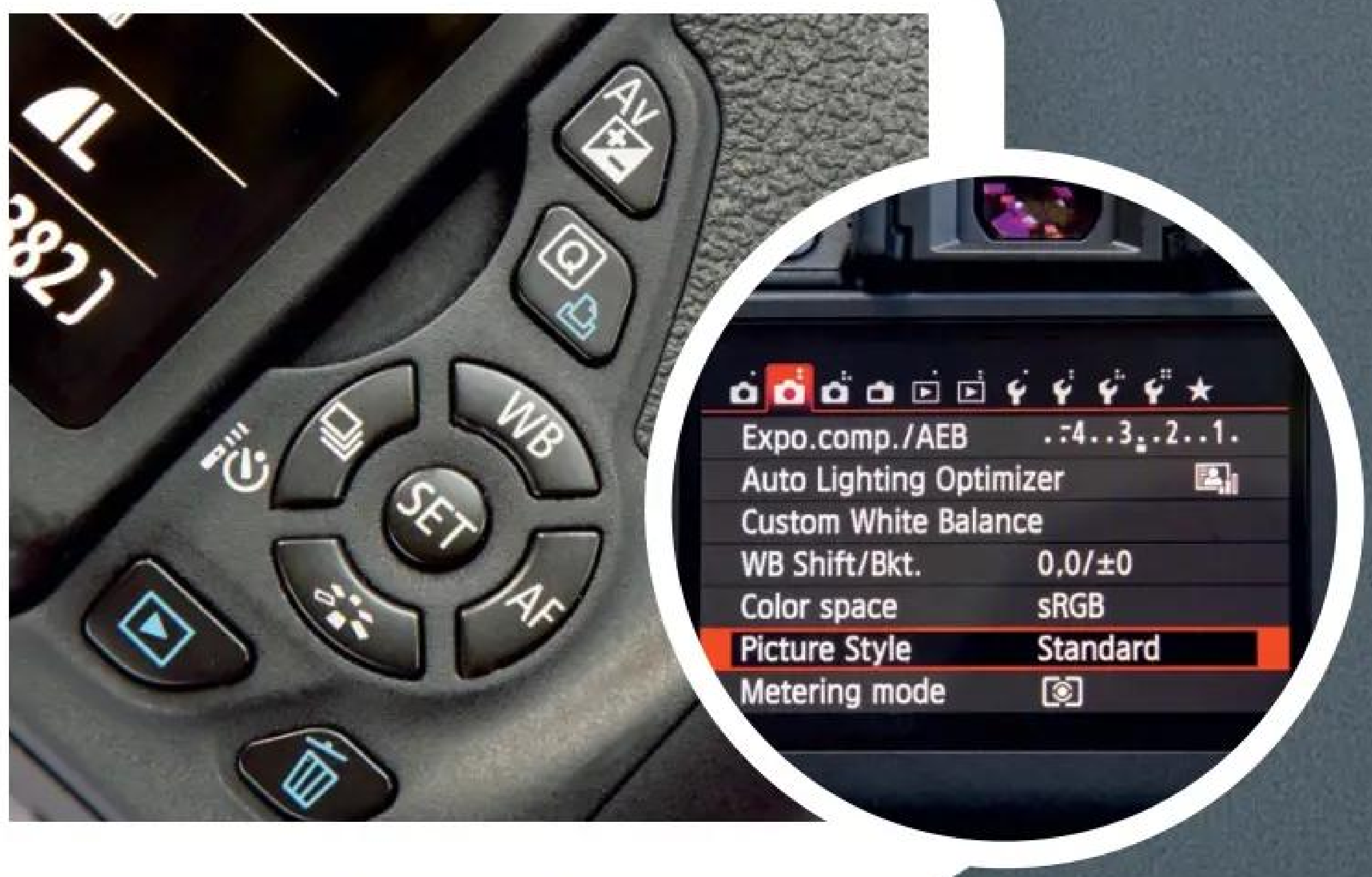
Turn the page to find out what Picture Style settings are available… ▶

Picture Style options

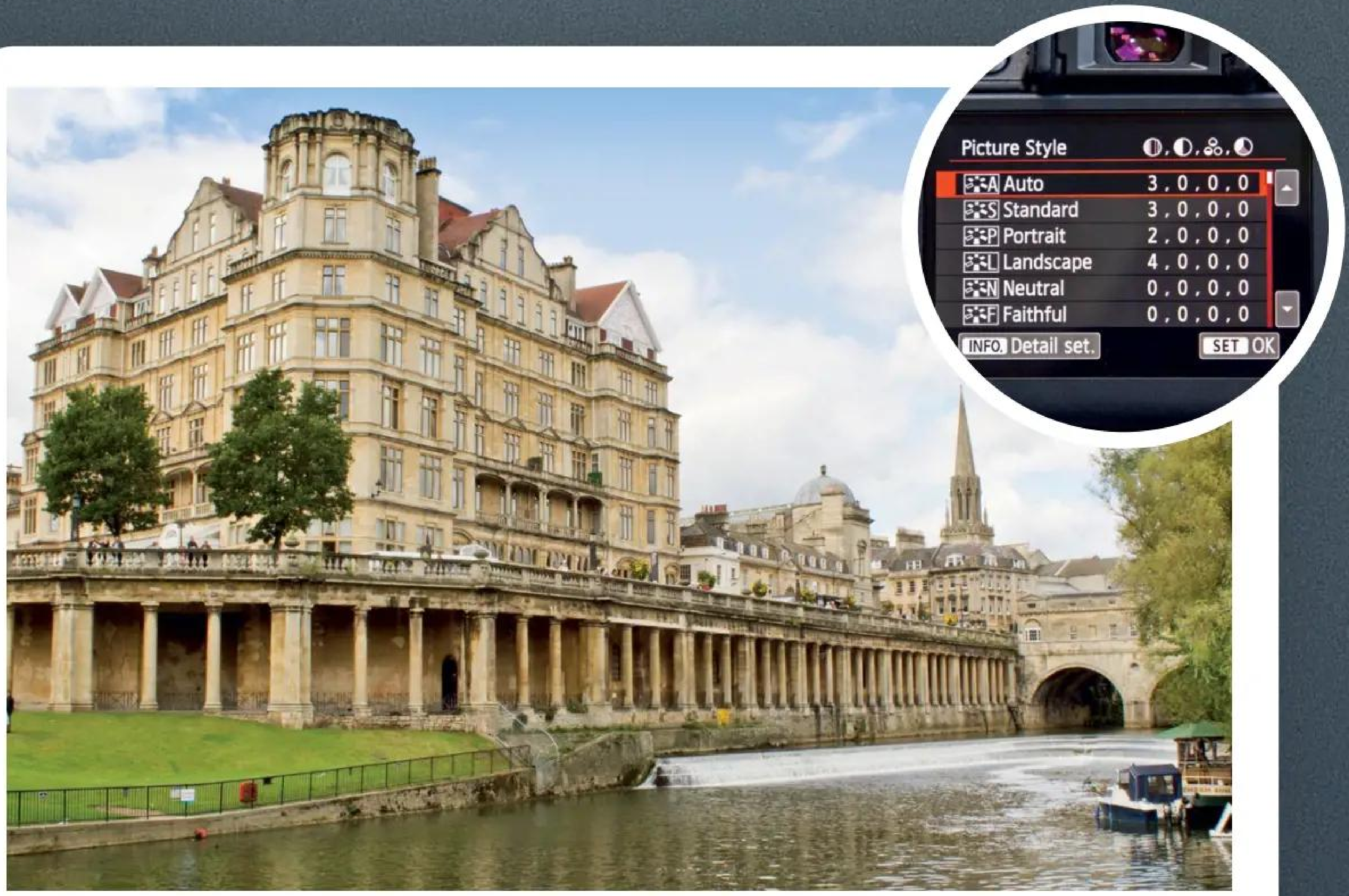
Discover how to apply Picture Style special effects to your images

Access the camera's Picture Styles

To find the Picture Style setting you have a couple of options. First head into the main menu and under the red camera settings section find Picture Style. Press Set to select and then navigate through the options. Alternatively, press the shortcut button on the back panel of your camera. The icon looks like small rectangles in a circle formation.



```
Expo.comp./AEB           ..4..3..2..1.
Auto Lighting Optimizer
Custom White Balance
WB Shift/Bkt.            0,0/±0
Color space              sRGB
Picture Style            Standard
Metering mode
```



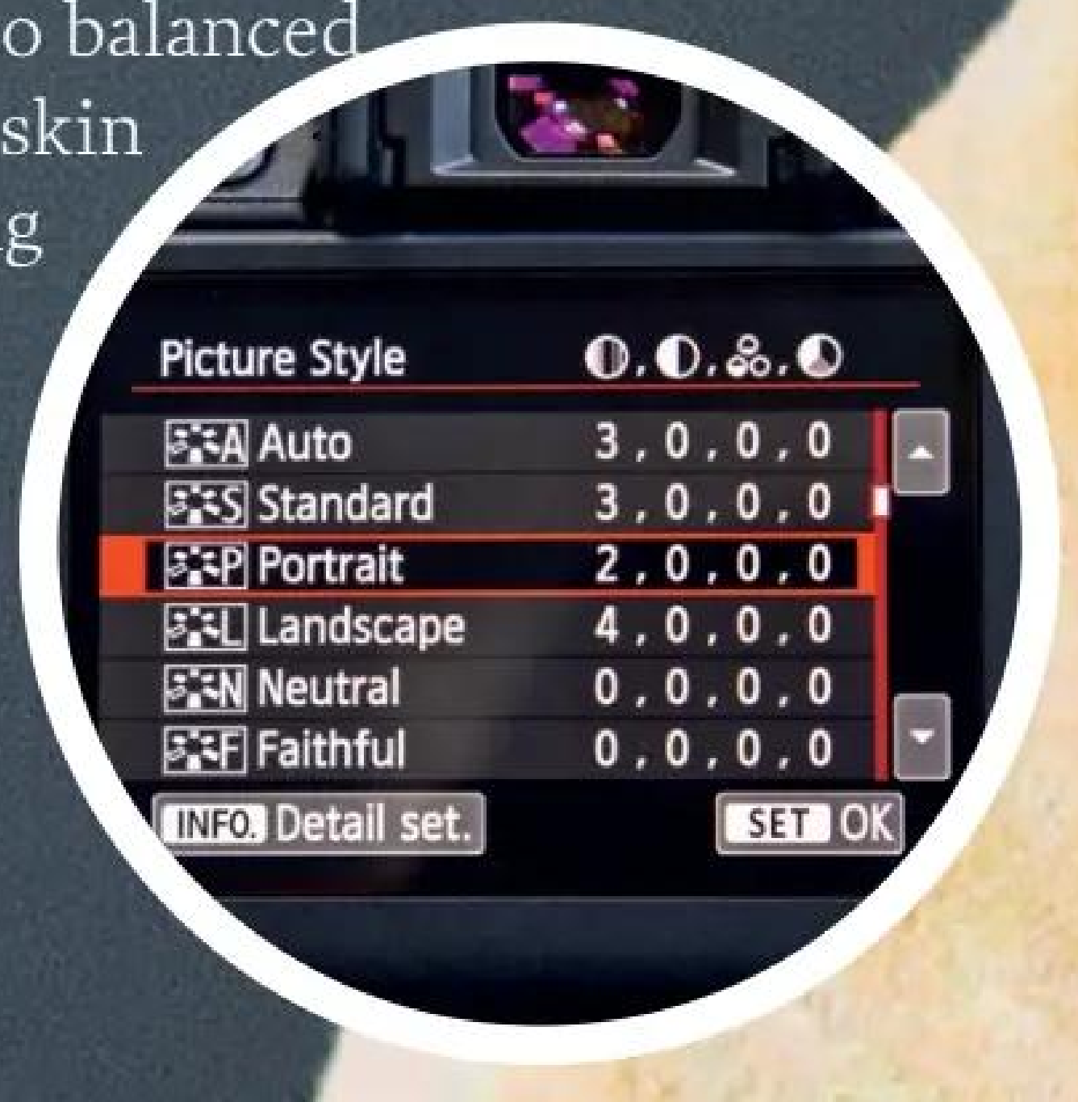
```
Picture Style
Auto        3,0,0,0
Standard    3,0,0,0
Portrait    2,0,0,0
Landscape   4,0,0,0
Neutral     0,0,0,0
Faithful    0,0,0,0
INFO. Detail set.       SET OK
```

The Auto Picture Style

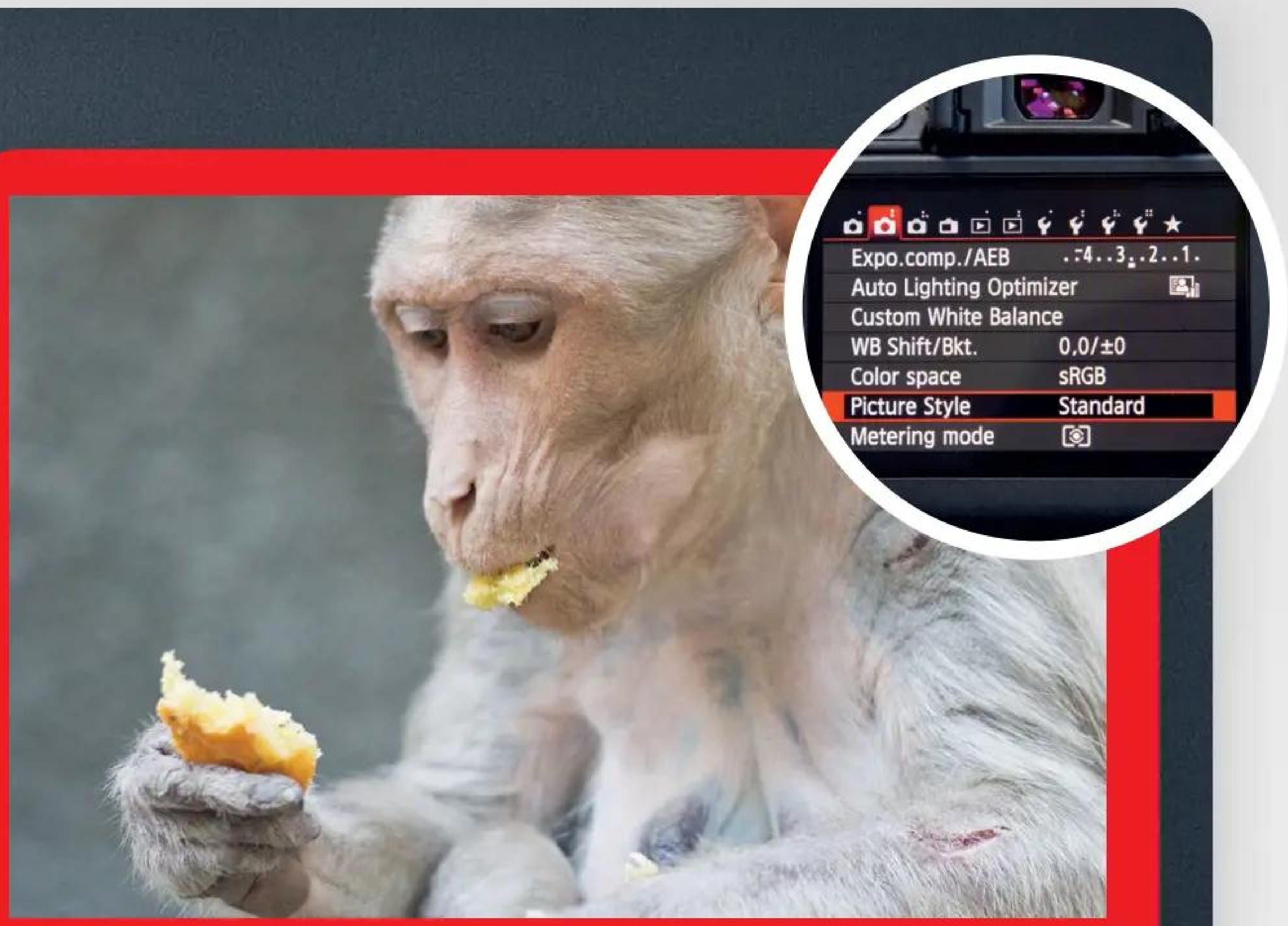
Not every Canon DSLR includes this option but some do. Auto works as you would expect. It makes selections on what it thinks are the correct settings (other than applying the monochrome style) for the conditions. It's great for those just starting out who want the camera to make the creative decisions.

The Portrait Picture Style

The Portrait Picture Style setting softens skin tones by decreasing the sharpness in the image. The Contrast and colour are also balanced to create warmer skin tones. This setting works best when photographing babies or those with pale



```
Picture Style
Auto        3,0,0,0
Standard    3,0,0,0
Portrait    2,0,0,0
Landscape   4,0,0,0
Neutral     0,0,0,0
Faithful    0,0,0,0
INFO. Detail set.       SET OK
```



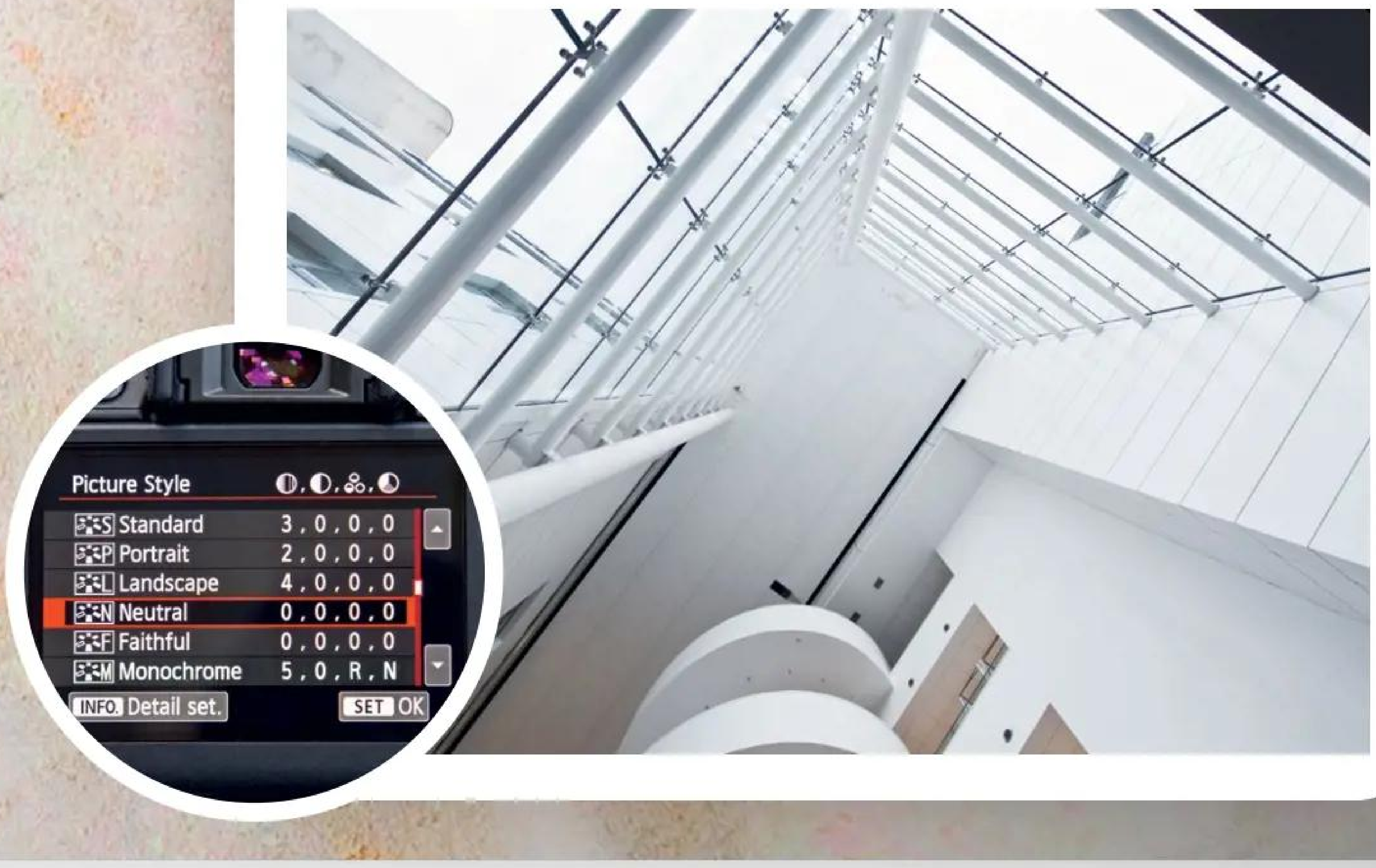
Expo.comp./AEB ..4..3..2..1.
Auto Lighting Optimizer
Custom White Balance
WB Shift/Bkt. 0,0/±0
Color space sRGB
Picture Style Standard
Metering mode

The Standard Picture Style

The Standard setting is the one you'll use the most, and by default most Canon DSLRs are set to this. This setting keeps the colours vivid and the image crisp. Images taken with this setting should be ready to print straight out of the camera.

The Neutral Picture Style

The Neutral style is designed for those who prefer to process the colours of the image in post-production. Programs such as Canon DPP, Lightroom, Photoshop, and Photoshop Elements are popular with photographers. You can then boost or reduce the colours to how you want them to appear.



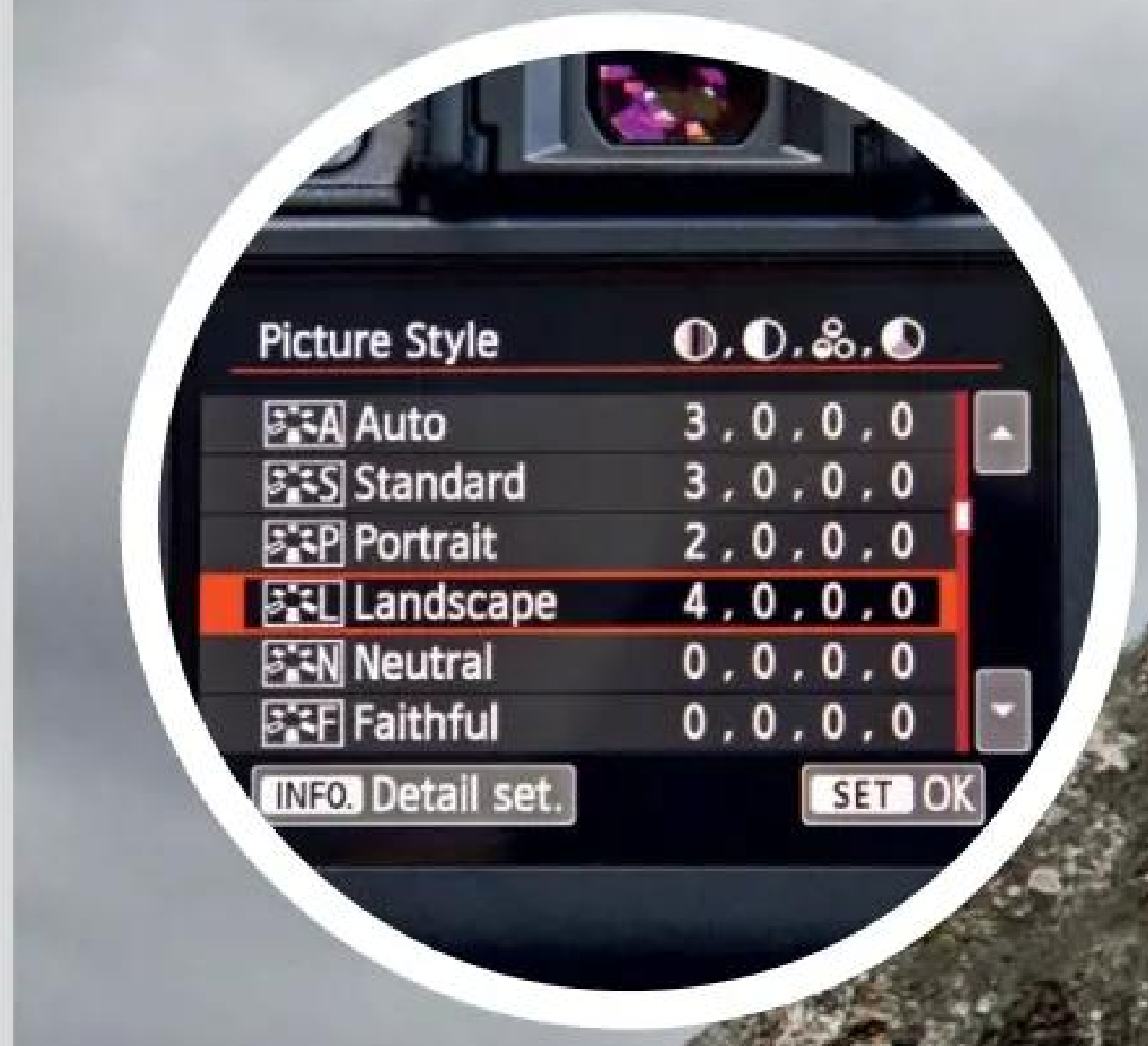
Picture Style	◐,◐,⁂,◐
Standard	3,0,0,0
Portrait	2,0,0,0
Landscape	4,0,0,0
Neutral	0,0,0,0
Faithful	0,0,0,0
Monochrome	5,0,R,N

Picture Style options

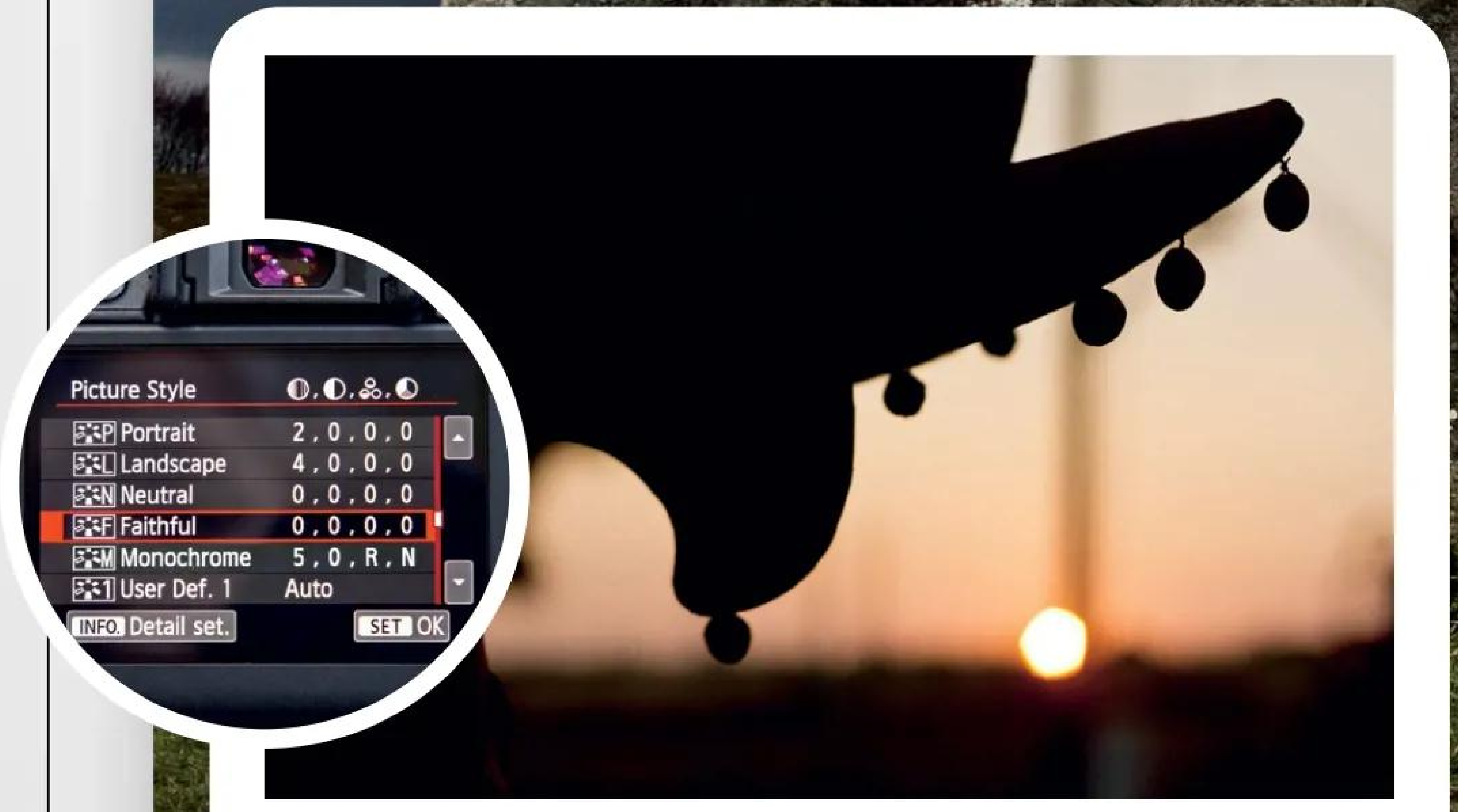
More Picture Style special effects to apply to your images

The Landscape Picture Style

The Landscape Picture Style boosts the sharpness in the scene to ensure the image is sharp from front to back. The blues and greens in the image are also enhanced to enrich the final result. When shooting in the Landscape scene mode (find it on the mode dial), this Picture Style setting is automatically applied.



Picture Style
Auto 3,0,0,0
Standard 3,0,0,0
Portrait 2,0,0,0
Landscape 4,0,0,0
Neutral 0,0,0,0
Faithful 0,0,0,0
INFO. Detail set.
SET OK



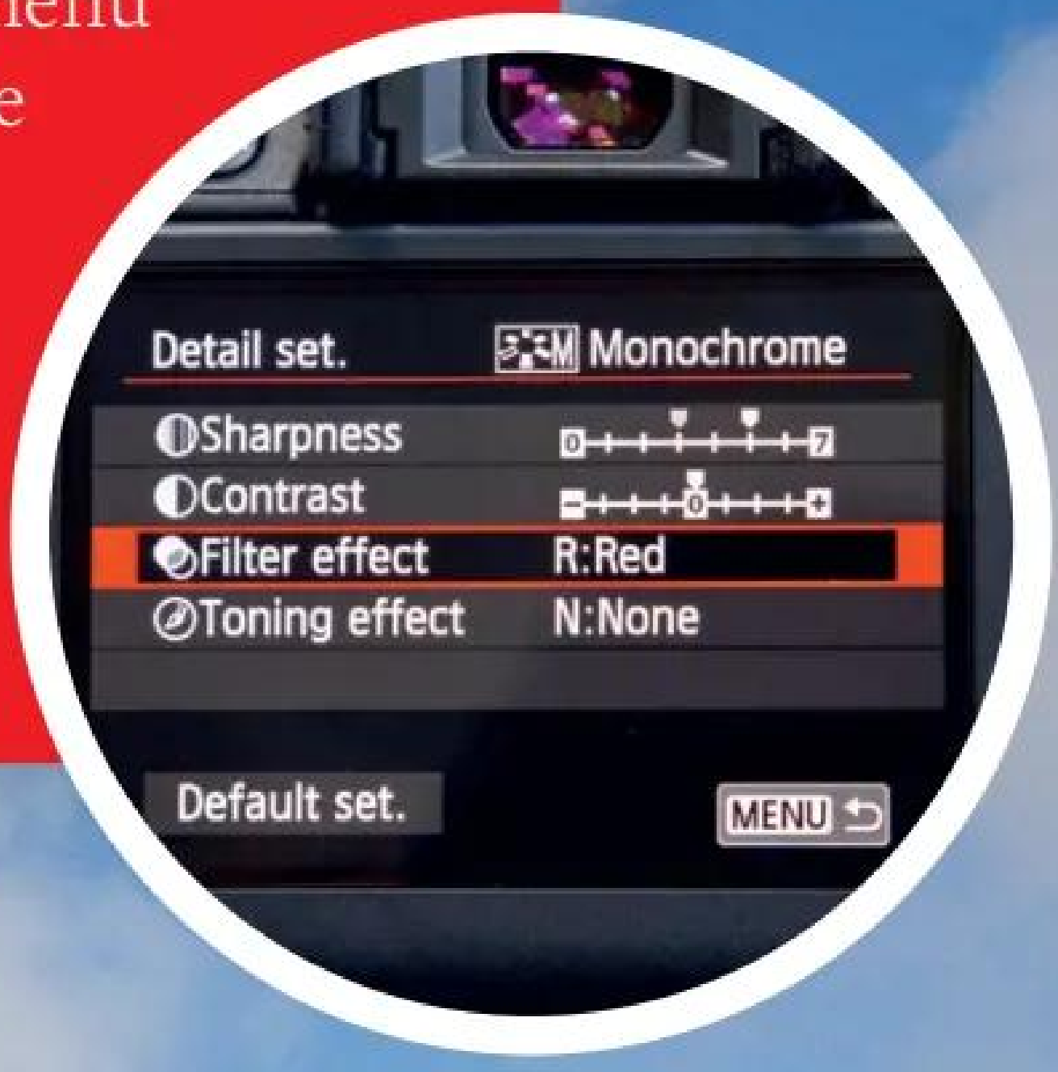
Picture Style
Portrait 2,0,0,0
Landscape 4,0,0,0
Neutral 0,0,0,0
Faithful 0,0,0,0
Monochrome 5,0,R,N
User Def. 1 Auto
INFO. Detail set.
SET OK

The Faithful Picture Style

Like the Neutral setting, the Faithful Picture Style is best used if you want more control post shoot. The image out of the camera will appear flat, and compared to the Standard setting the sharpness is reduced to give you a clean file to work with. Good for those who like to be in control!

Tweak the Picture Styles

You can further alter the Picture Style setting by pressing the Info button. It will take you to an alternative menu setting where you can adjust the settings. The Monochrome Picture Style setting includes different options from the rest. However, the default settings are Sharpness,



Detail set. Monochrome

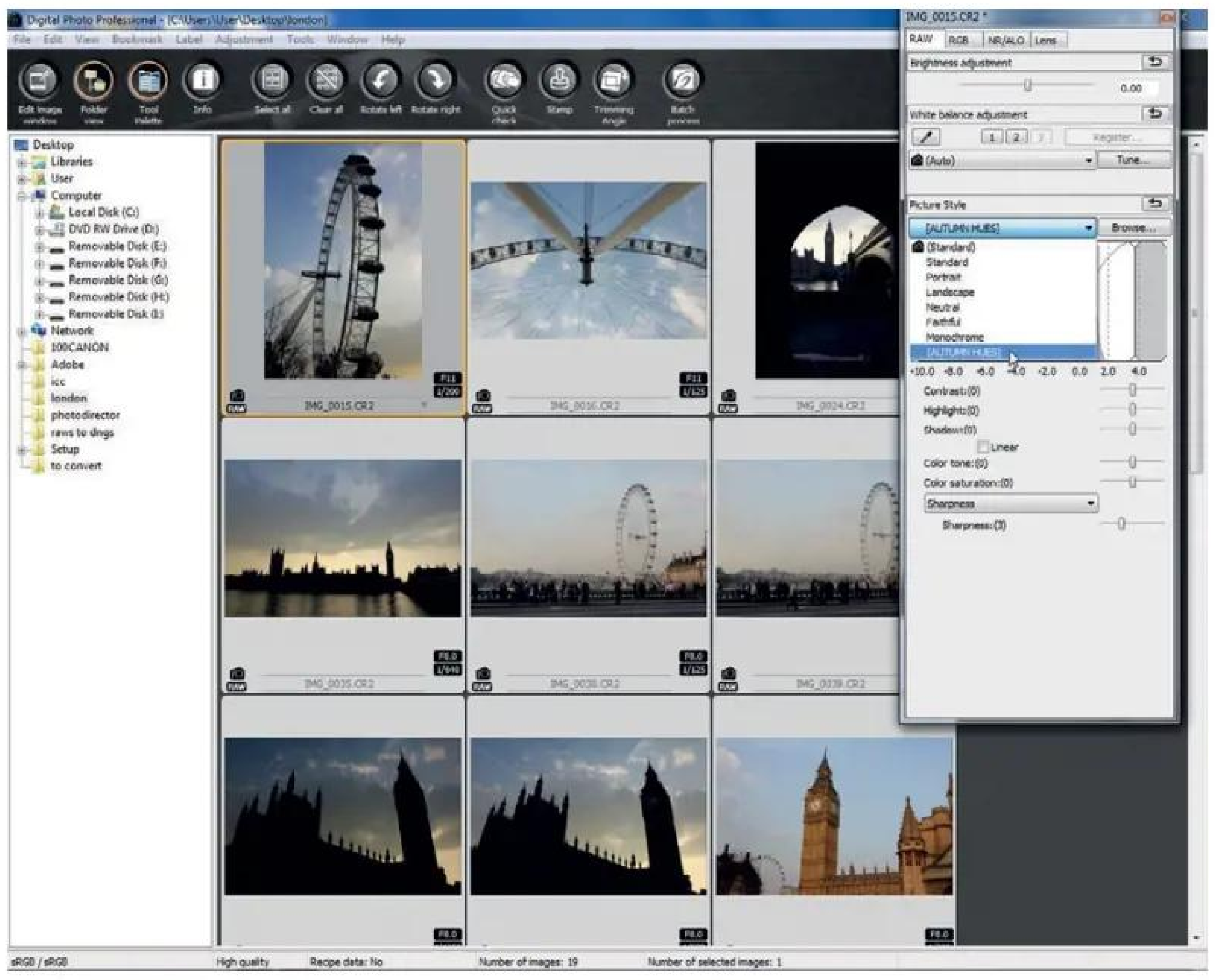
Sharpness

Contrast

Filter effect R:Red

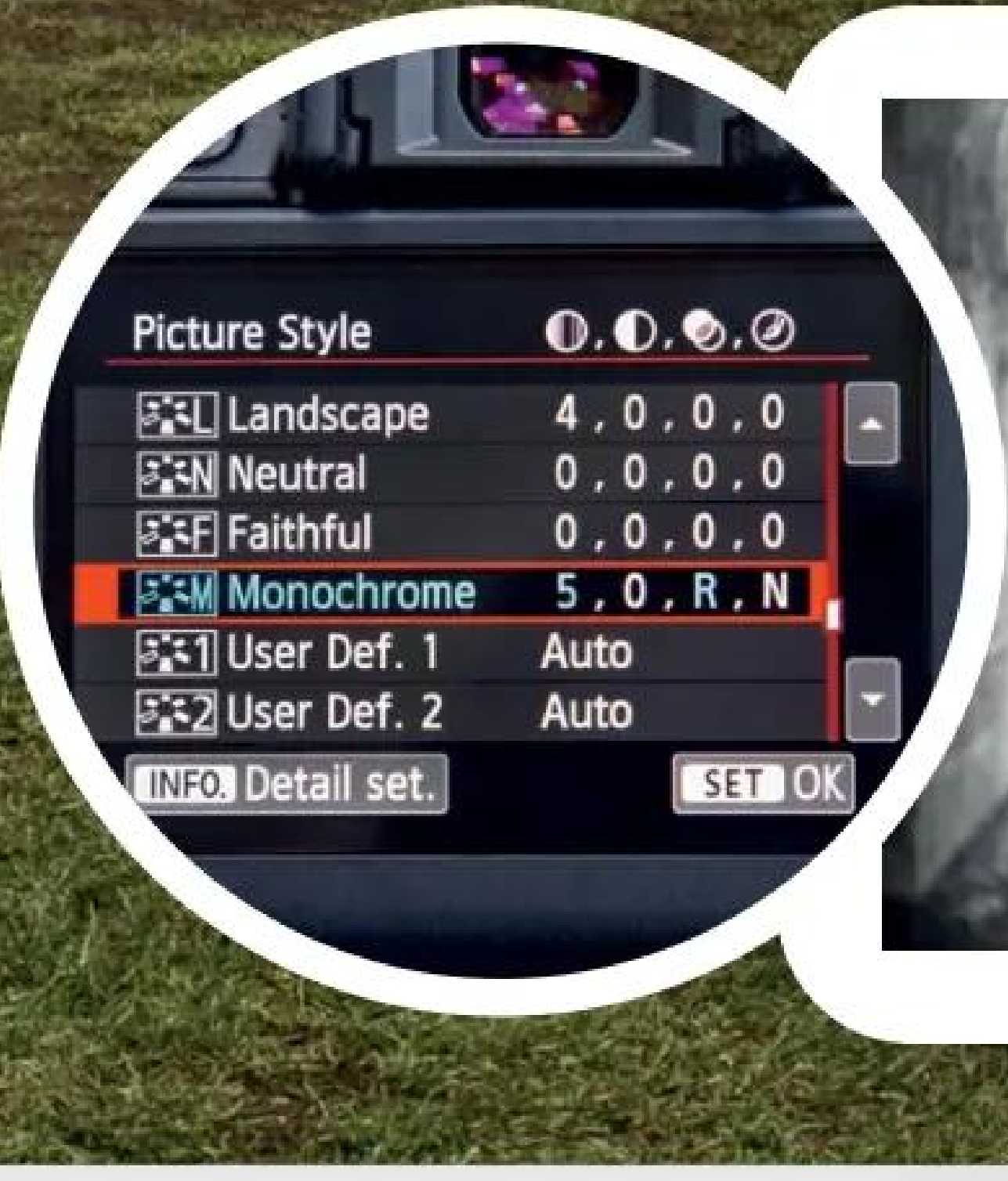
Toning effect N:None

Default set.



Download more styles

In your Picture Style menu there are three user-defined settings. You can create your own Picture Style here by adjusting the various settings. You can also download a Picture Style from the Canon website (http://web.canon.jp/imaging/picturestyle/file/index.html) and add it to your images in Canon DPP.



Picture Style	
Landscape	4 , 0 , 0 , 0
Neutral	0 , 0 , 0 , 0
Faithful	0 , 0 , 0 , 0
Monochrome	5 , 0 , R , N
User Def. 1	Auto
User Def. 2	Auto

The Monochrome Picture Style

The Monochrome style is the most useful of the bunch, and is a quick and easy way to take great black-and-white images. You can recreate film, filter and toning effects by pressing the Info button. The options in the filter menu are yellow, orange, red and green. These decide how much contrast to add to the image. The red filter gives you the most contrast. You then have the option to additionally add a toning effect: sepia, blue, purple and green. These determine the overall tone of the image. You can also combine the two together, to get, for example, a blue toned image with a red filter. ■

Fill-in flash

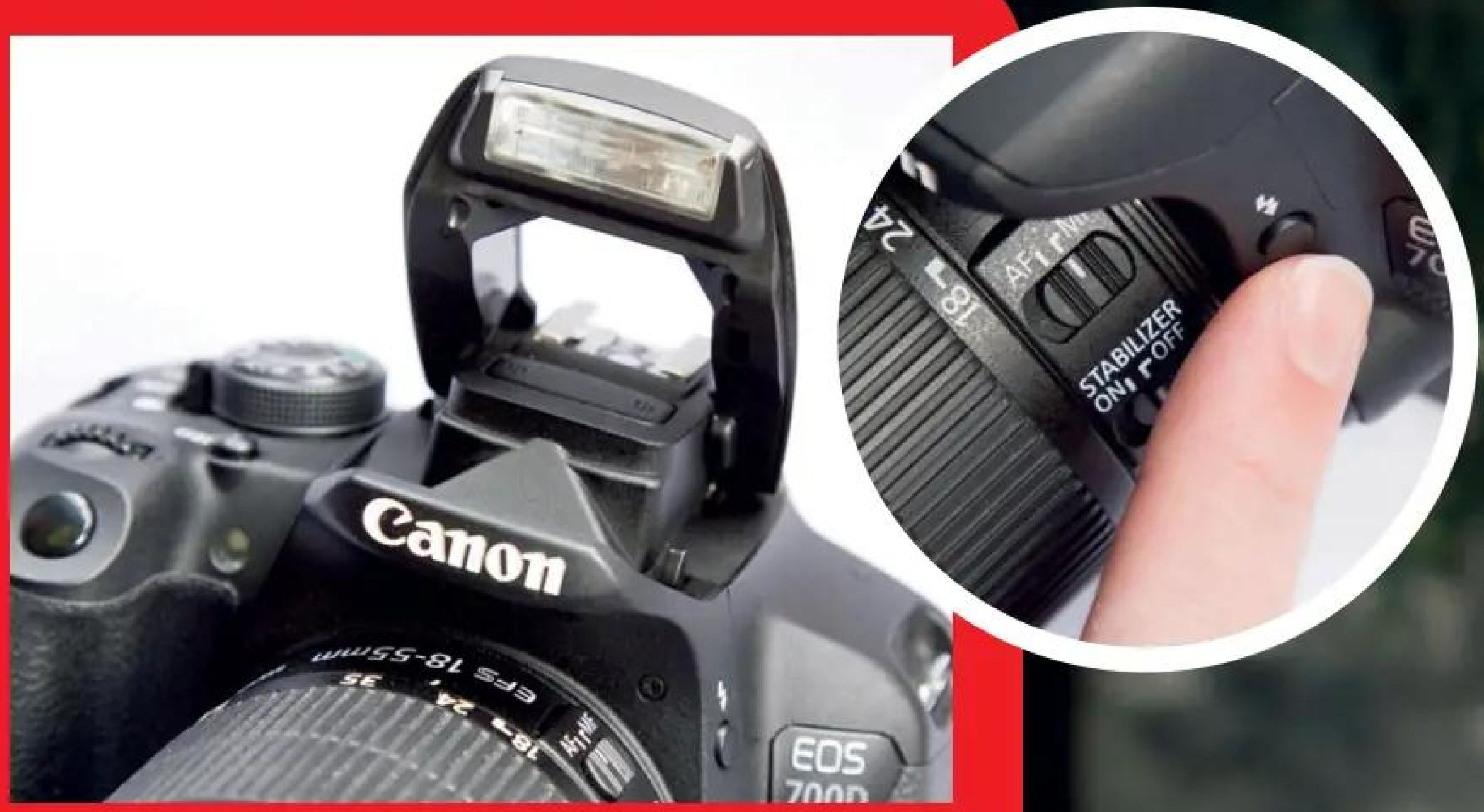
Enhance your portraits by eliminating harsh shadows using your DSLR's built-in flash unit

There will be times when the ambient light isn't strong enough to light your subject, and when this is the case you should use your pop-up flash. However, it has the tendency to ruin the atmosphere, and in all honesty it isn't a miracle worker! Professional photographers use external flashguns or studio lights to illuminate their subjects, because the pop-up flash is limited in what it can do and how far it can fire. However, there are times when it will come to the rescue, and you'll be surprised at the few tricks it has hidden away!

Turn the page to see our top flash tips so you know when to use it, and when it's best to avoid it.

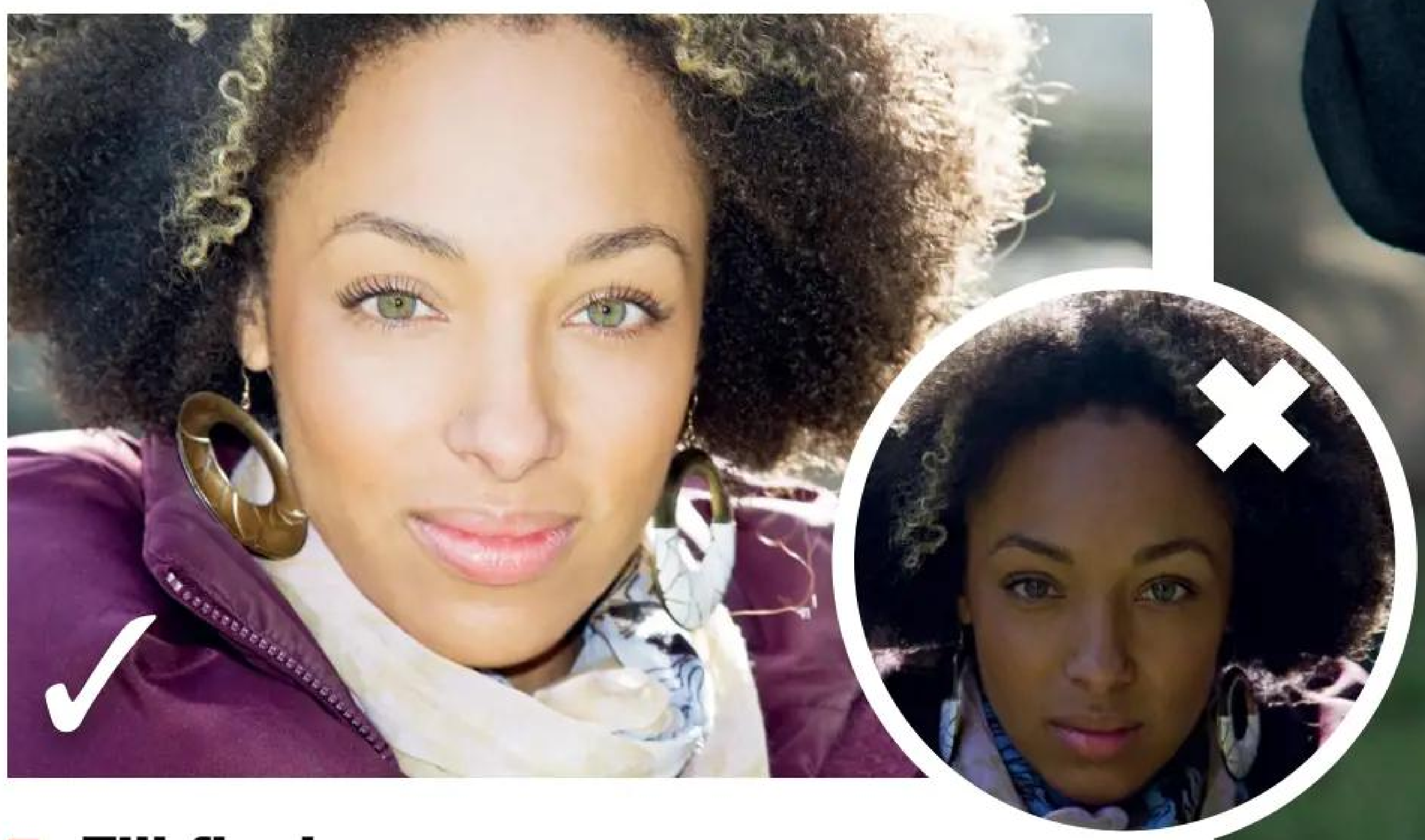
Let there be light

We reveal all our top shooting tips for using your built-in pop-up flash unit



Engage the flash

To pop the flash, press the lightning symbol button. You can manually activate it in any of the creative shooting modes (P, Av, Tv, or M). It's worth noting that it will automatically engage in low light in the fully automatic and scene modes (apart from the no flash option).



Fill flash

It's easy to think that on a sunny day you don't need extra light, but you'd be wrong. It's the perfect time to pop some flash into the shadows created by the harsh sunlight. In the inset shot, notice the unflattering shadows across the face. If you simply pop the flash you can see how it's lifted the face and removed the ugly distractions.

Tv 1/200
ISO AUTO
-3..2..1..0..1..2.:3
AWB
ONE SHOT
L
[1235]

Flash sync settings

Your Canon DSLR has a flash sync shutter speed setting. That may sound complicated, but it's actually quite simple. As the flash light fires, if the shutter speed setting is too fast, then the flash light can't reach your camera's sensor in time. The maximum shutter flash sync speed varies between 1/200 sec and 1/250 sec depending on the camera. Of course, you can use a shutter speed setting that's much slower than this, which can be effective if you want to capture movement in the scene and freeze the beginning or end of the frame. It can work effectively with people dancing or performing an action sequence.

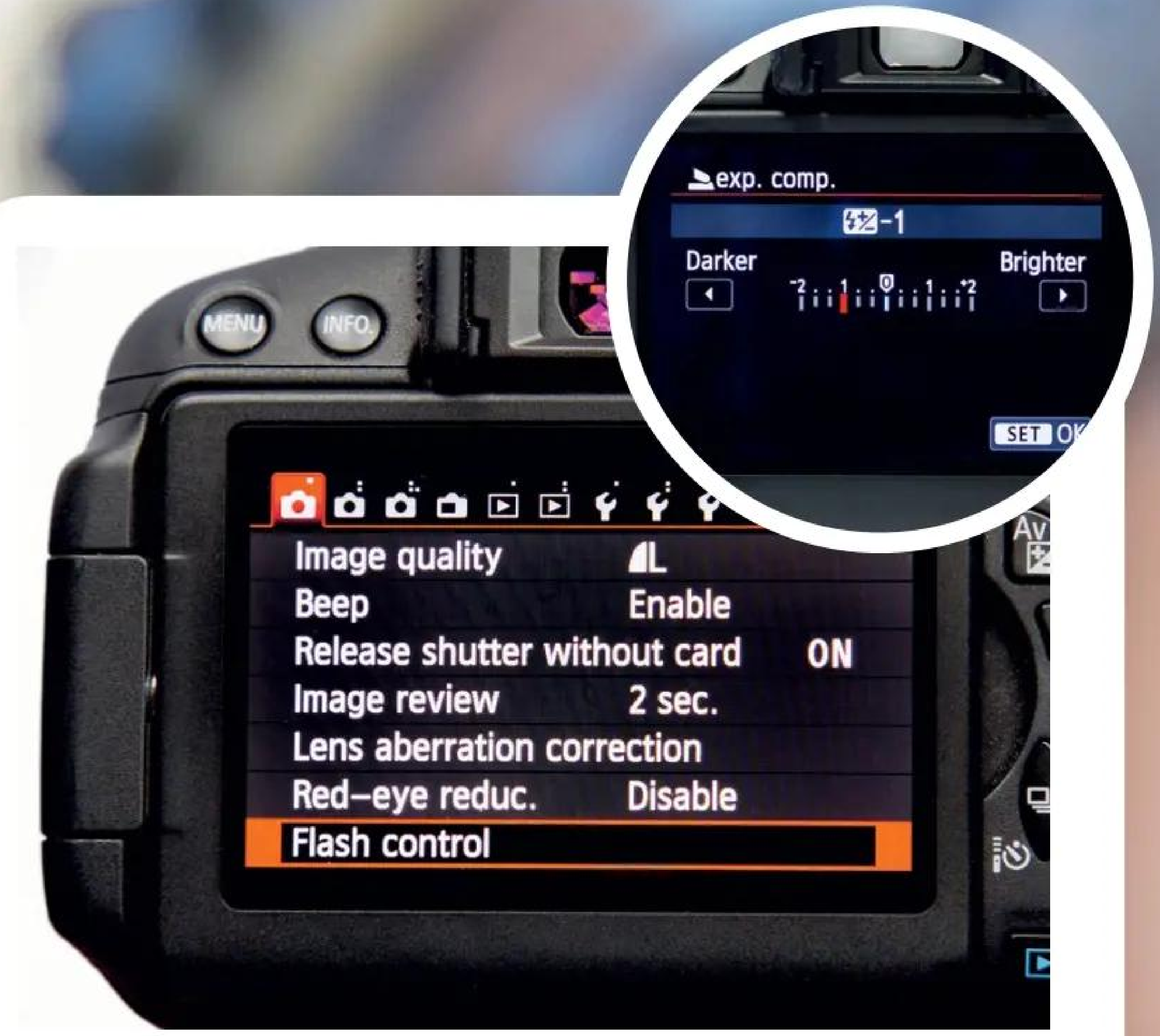
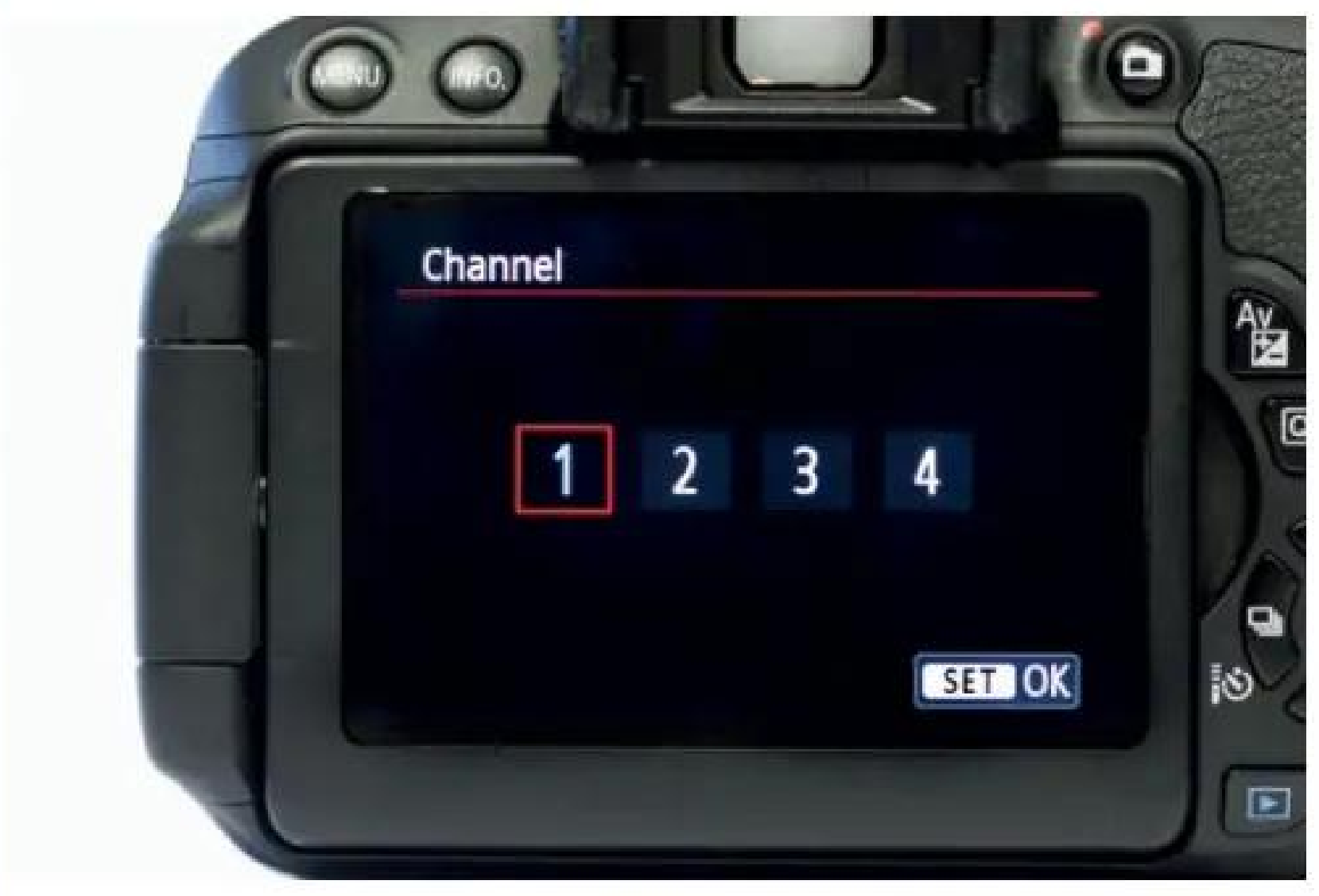
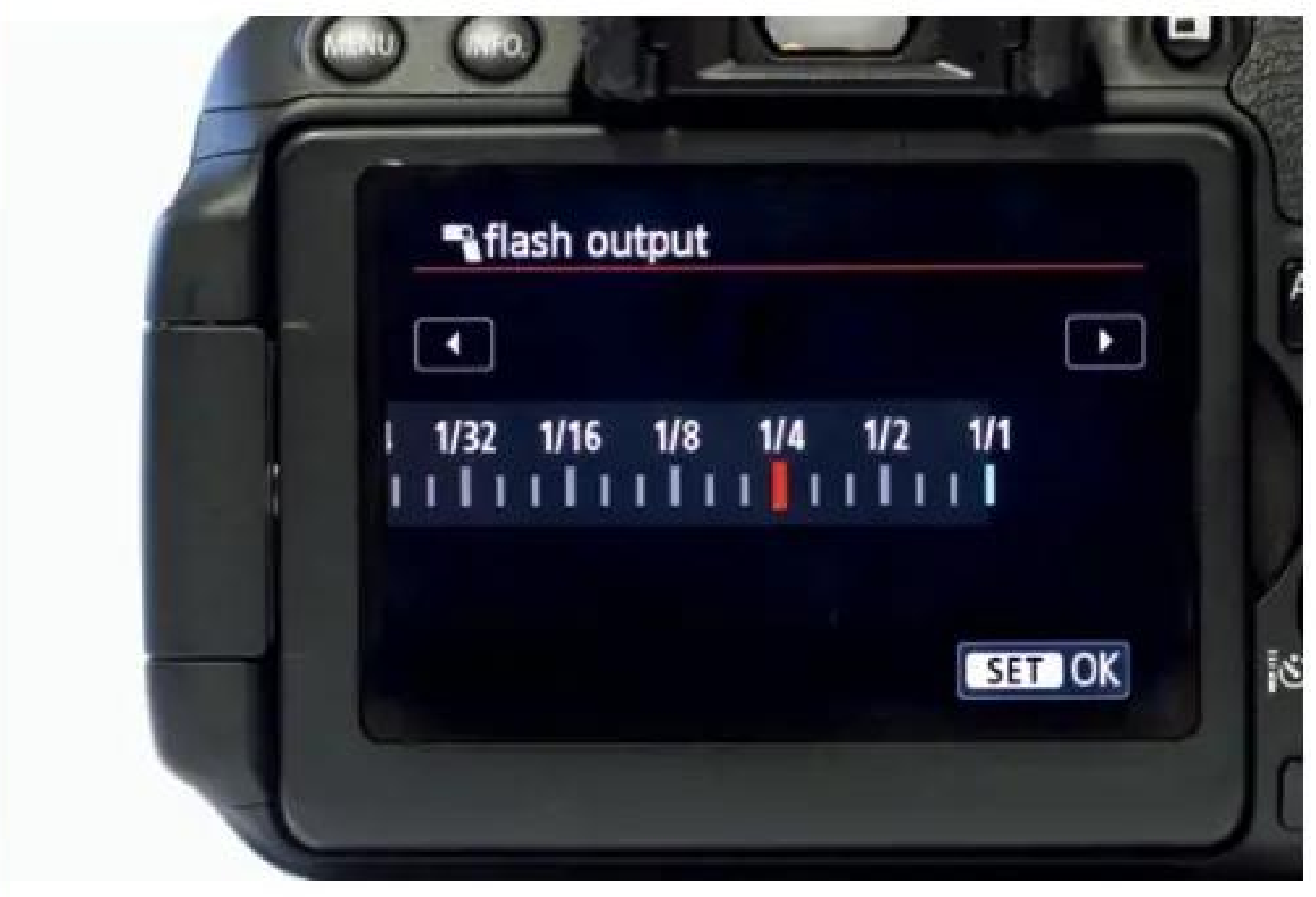


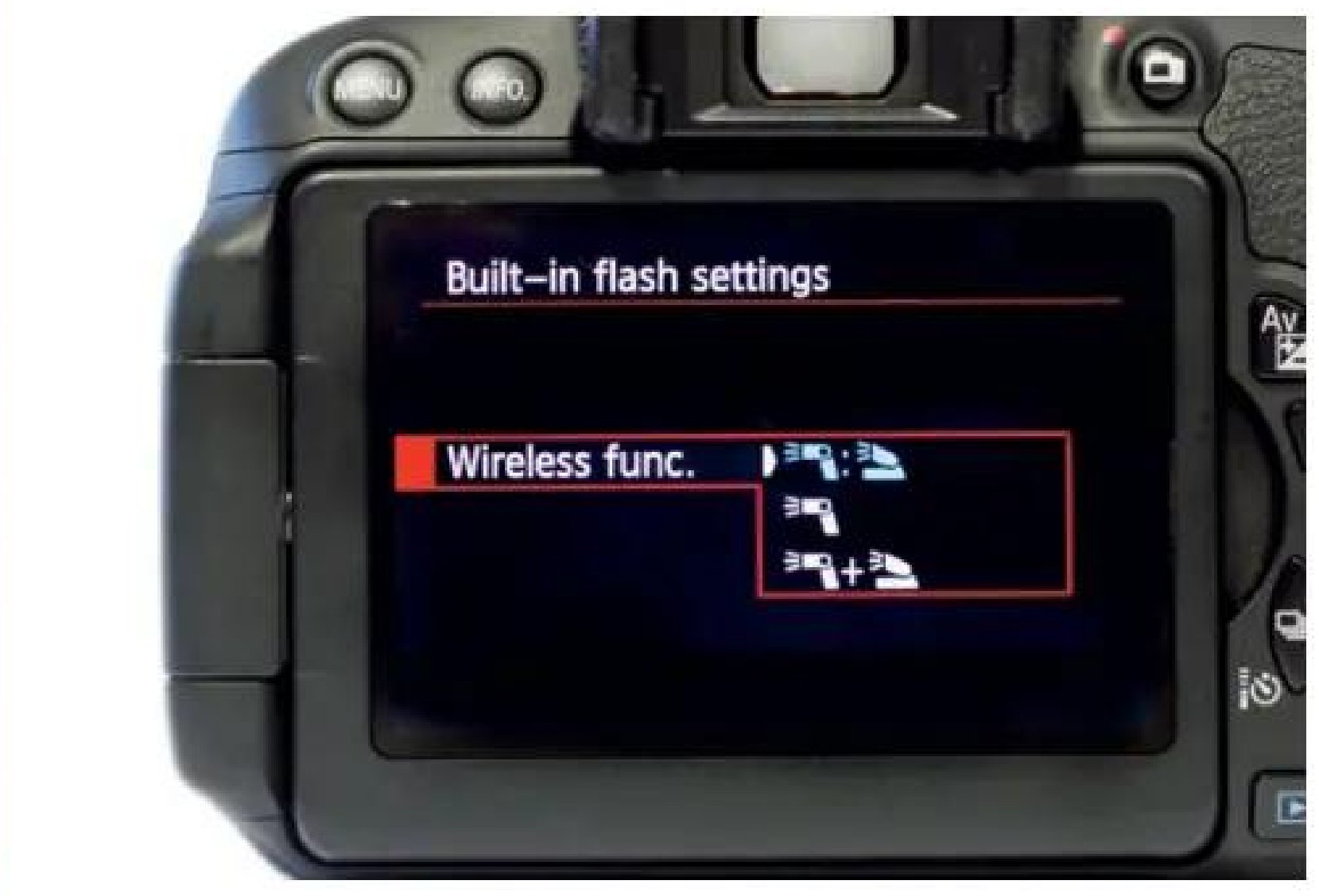
Image quality L
Beep Enable
Release shutter without card ON
Image review 2 sec.
Lens aberration correction
Red-eye reduc. Disable
Flash control

Built-in flash settings

Your Canon camera has a few handy options in the flash control menu. You'll find this setting in the red part of the main menu. One of the most useful features of the 'Built-in flash func. setting' menu is you can adjust the strength of the flash. It works exactly the same as when you control the exposure compensation. Simply turn the 'exp. comp.' setting up the scale for more light and down for less. Again, this scale is measured in a stop system, and is spilt into thirds of a stop for finer control.







Using an external flash

Your built-in pop-up flash is capable of triggering an external flash unit. The external device first needs to have this feature, and to be compatible with a Canon DSLR. Canon produces external flashguns called Speedlites, and these range in price and specification. To fire an external flashgun from your pop-up flash, go to Menu›Flash Control›Built-in flash func. and then change the 'Wireless func.' to one of the shooting icons. If you alter the Flash Mode to Manual flash setting, you can then control the strength of the flash from your camera, which is a useful trick. You also need to make sure that the Channel is set to the same number on your camera and flashgun. Finally, it's important that the pop-up flash and the flash unit can see each other to communicate. Your flashgun will flash a red dot when it's ready to fire.

Bracket your exposures

Use the AEB feature to take three different exposures of the same scene

Bracket exposing is when you take several shots of the scene at different exposure values so you can blend them together at the editing stage. It's a useful trick in high-contrast lighting, because it means you can get a correctly exposed image of the shadows, highlights and midtones all in one. The technique works best when shooting landscapes or a still-life subject, and in order for it to work you need to mount your camera on a tripod so that your camera stays in exactly the same position.

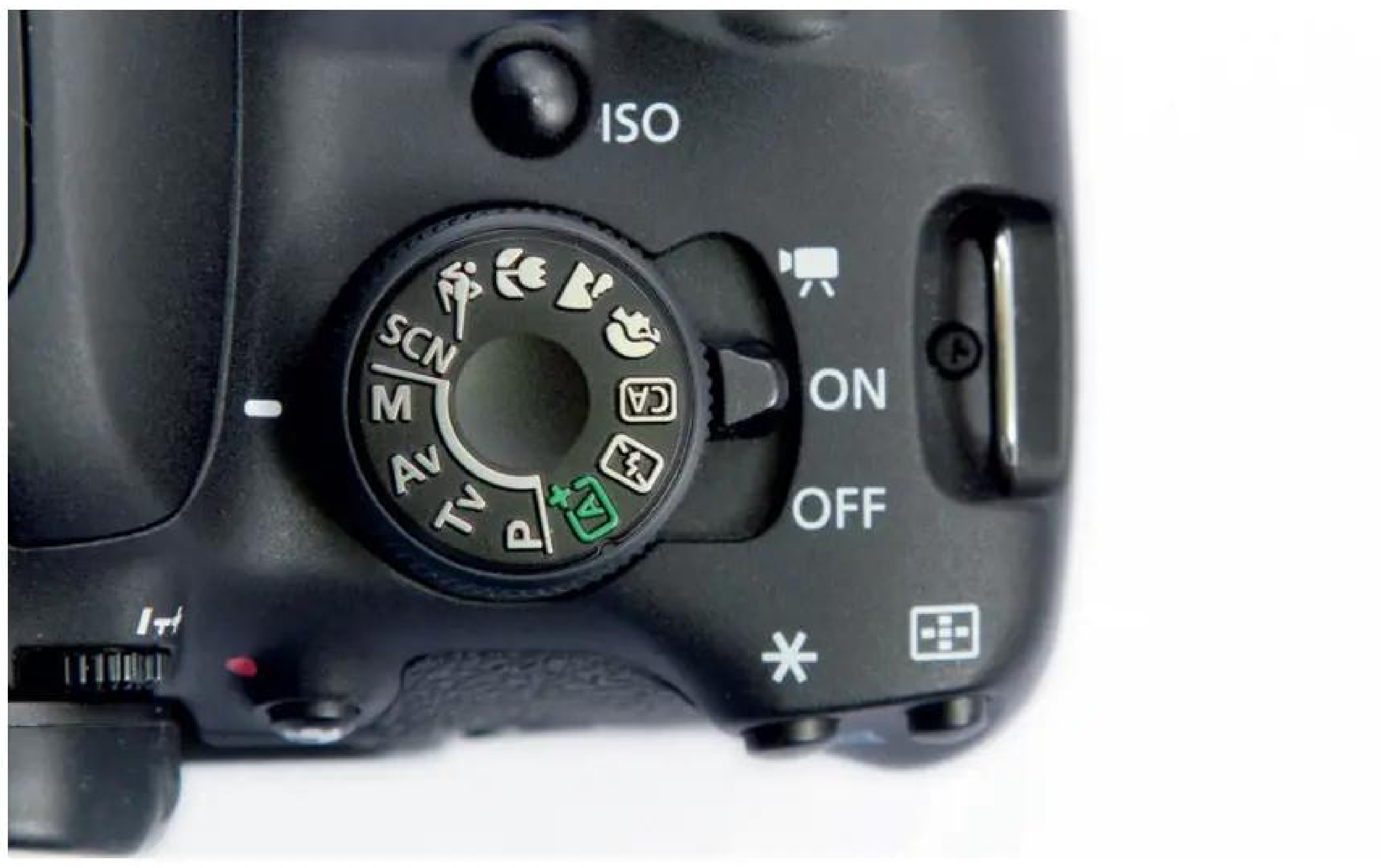
As you've probably guessed, your Canon DSLR has a great feature for helping us to do this. It's called AEB, Auto Exposure Bracket. Turn the page to follow our step-by-step guide so you can try this technique out for yourself. Of course, you'll only want to use this technique if you can edit the images together. In Canon's free Digital Photo Professional software, there's a great HDR feature you'll find in the Tools section, where you can merge the exposures.

1 Pick the right subject

This technique works best in a landscape setting or when shooting still lifes. You'll also find it best when presented with high-contrast light and you want to capture all the detail in the highlights through to the shadows.

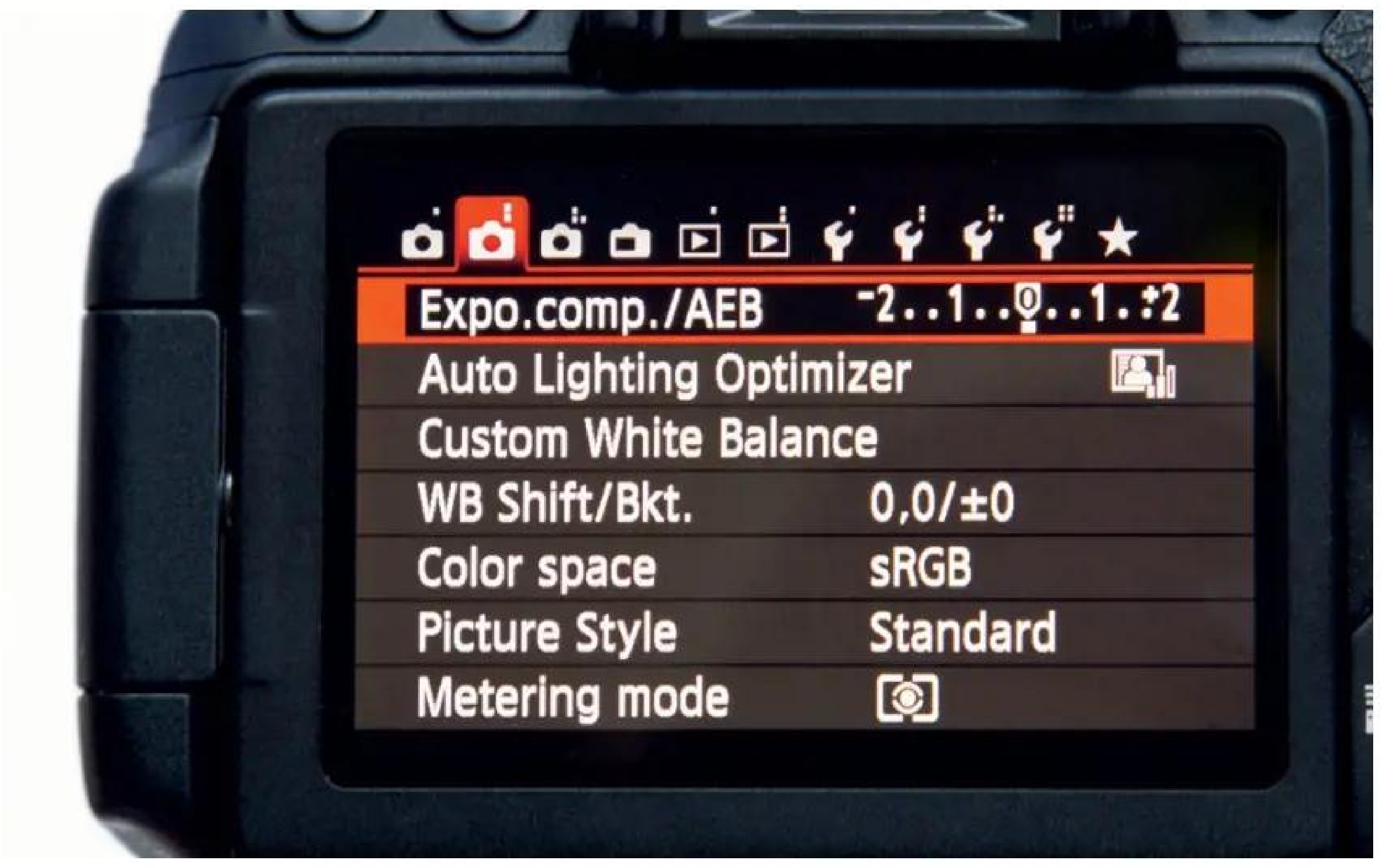
2 Use a tripod

For the technique to work you're going to need to set up your camera on a tripod. This means that when you come to edit your images they will all match up. It's very important not to move your tripod when taking the pictures.



3 Set up your camera

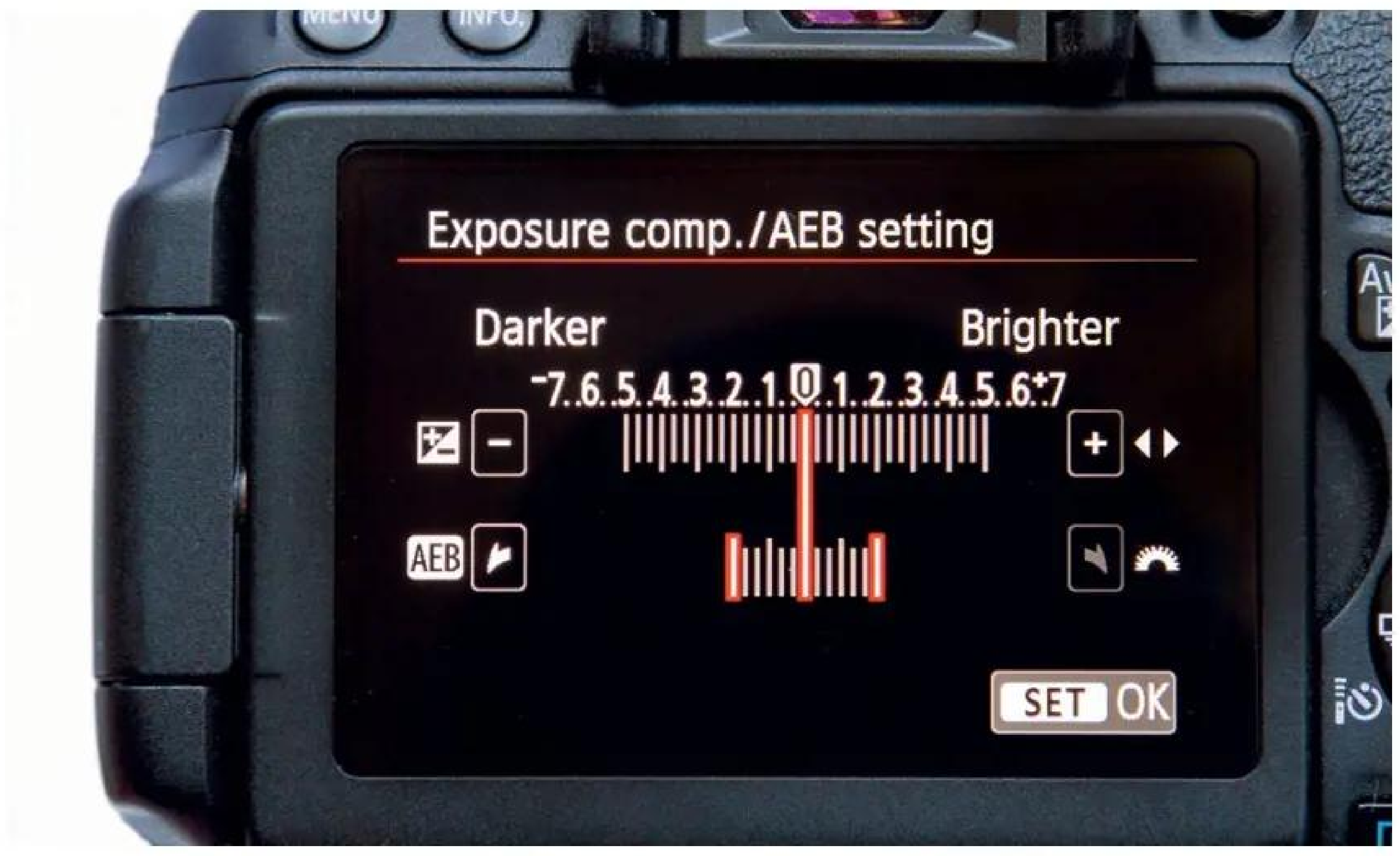
The AEB feature will work in any of the creative shooting modes. When shooting landscapes it's best to keep the ISO and aperture at the same setting for all the exposures. So, set your camera to either Av or Manual mode for consistency.



Expo.comp./AEB -2..1..0..1..+2
Auto Lighting Optimizer
Custom White Balance
WB Shift/Bkt. 0,0/±0
Color space sRGB
Picture Style Standard
Metering mode

4 Activate bracketing

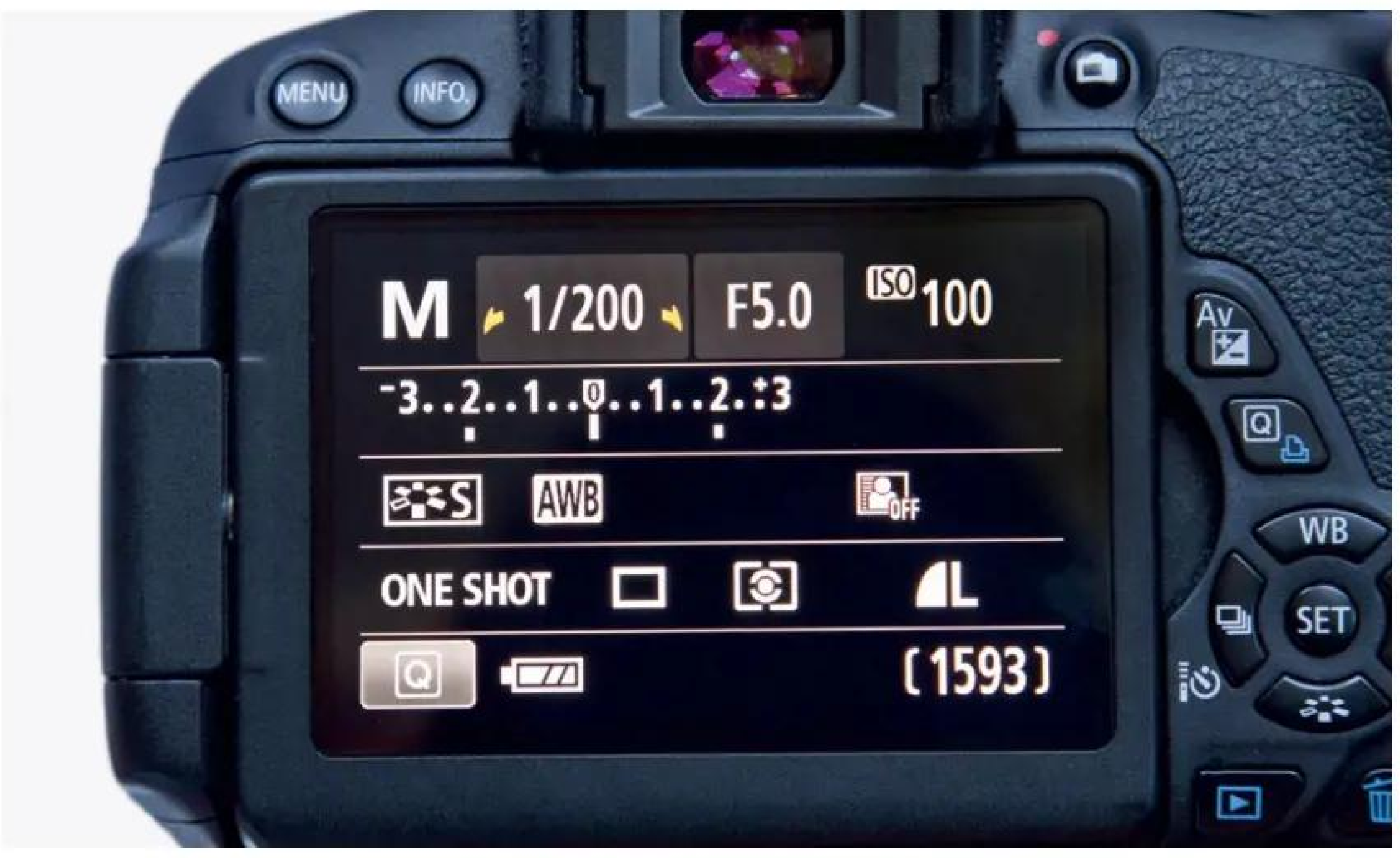
To find the AEB setting, press the Menu button, and in the Red camera section look for Expo.comp./AEB. Press Set, and a meter scale will appear. You can now define how many stops apart the images will be.



Exposure comp./AEB setting
Darker Brighter
-7..6..5..4..3..2..1..0..1..2..3..4..5..6..+7
AEB
SET OK

5 Adjust the stops

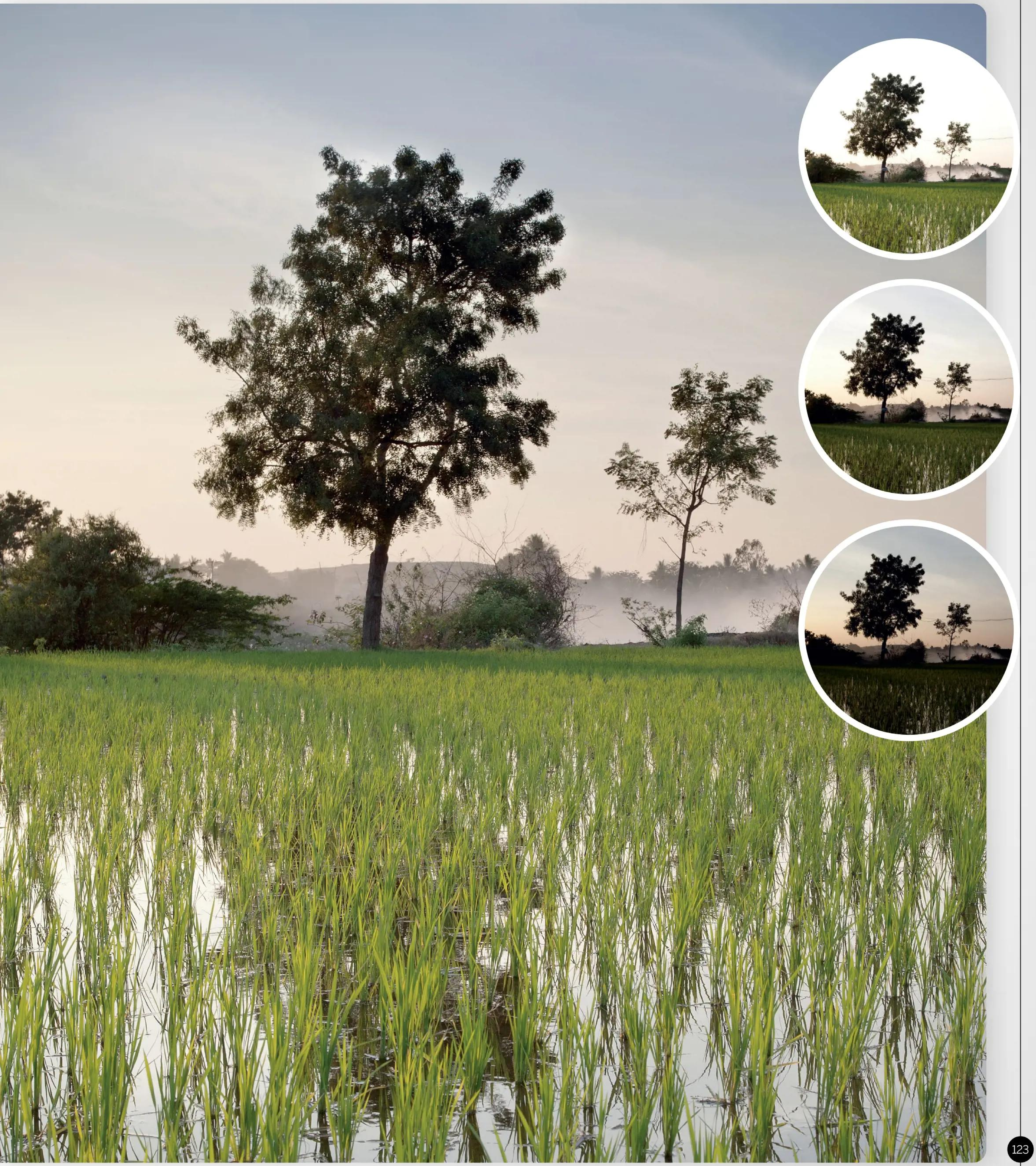
Turn the command dial to bring up a box. Now turn the command dial again to start moving the exposure values apart. You'll notice two lines spilt in opposite directions. You can adjust the setting in full stops or thirds.

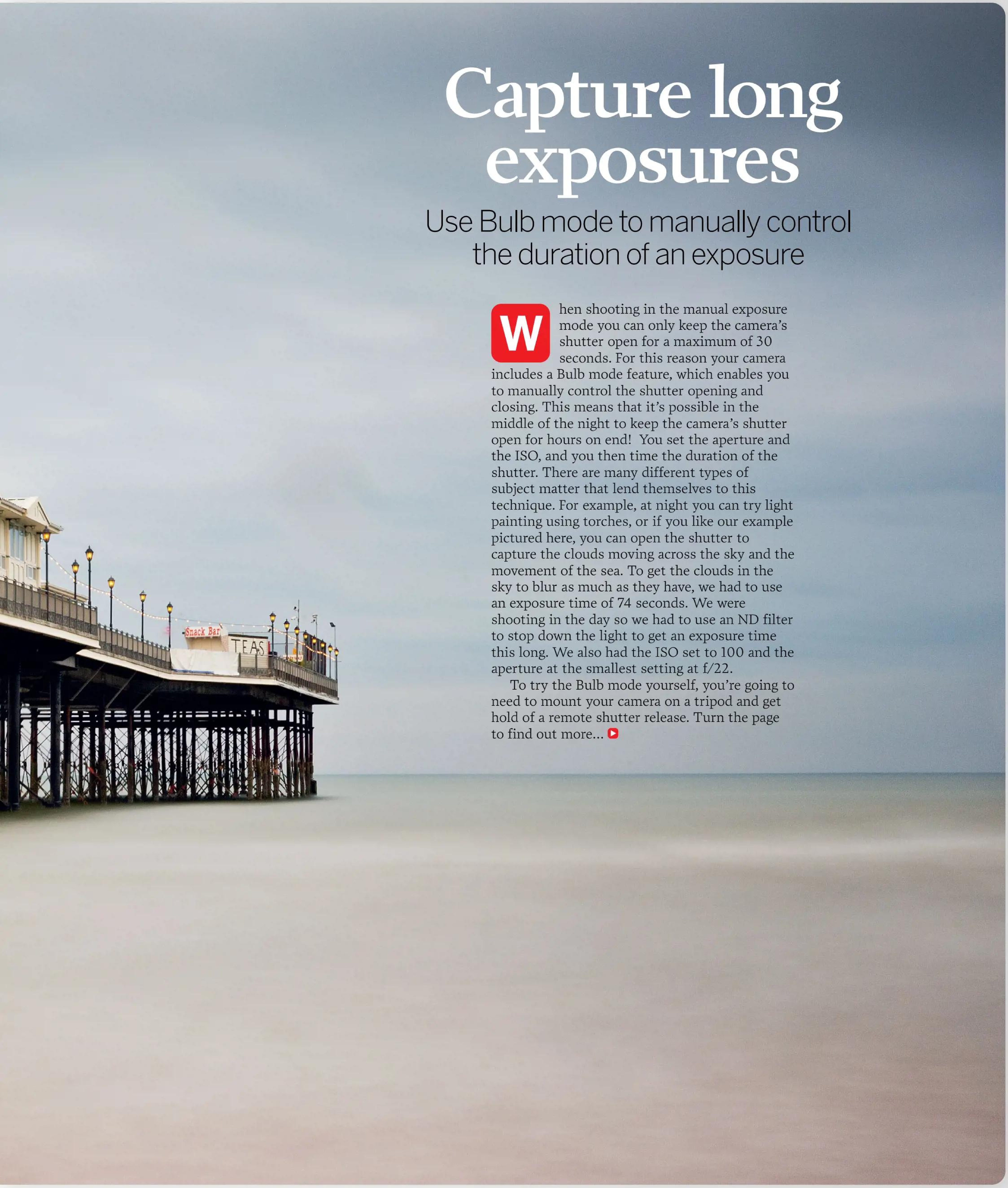


M 1/200 F5.0 ISO 100
-3..2..1..0..1..2..+3
AWB
ONE SHOT
[1593]

6 Take the pictures

Press the shutter-release button three times to take the three photos with the different settings. After you've finished using the feature, disable it, because otherwise your camera will carry on shooting three photos.





Capture long exposures

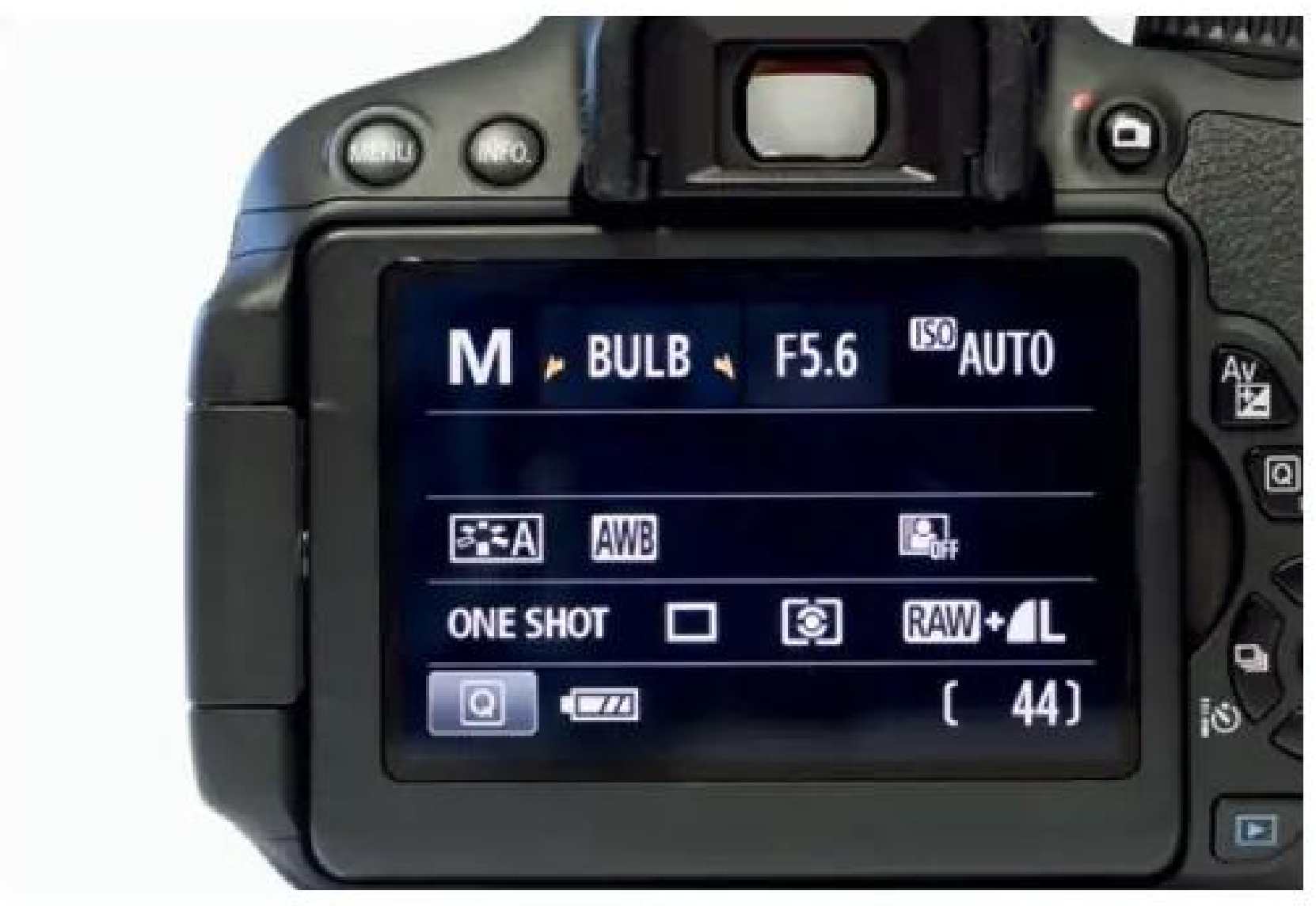
Use Bulb mode to manually control the duration of an exposure

When shooting in the manual exposure mode you can only keep the camera's shutter open for a maximum of 30 seconds. For this reason your camera includes a Bulb mode feature, which enables you to manually control the shutter opening and closing. This means that it's possible in the middle of the night to keep the camera's shutter open for hours on end! You set the aperture and the ISO, and you then time the duration of the shutter. There are many different types of subject matter that lend themselves to this technique. For example, at night you can try light painting using torches, or if you like our example pictured here, you can open the shutter to capture the clouds moving across the sky and the movement of the sea. To get the clouds in the sky to blur as much as they have, we had to use an exposure time of 74 seconds. We were shooting in the day so we had to use an ND filter to stop down the light to get an exposure time this long. We also had the ISO set to 100 and the aperture at the smallest setting at f/22.

To try the Bulb mode yourself, you're going to need to mount your camera on a tripod and get hold of a remote shutter release. Turn the page to find out more...

Timed to perfection

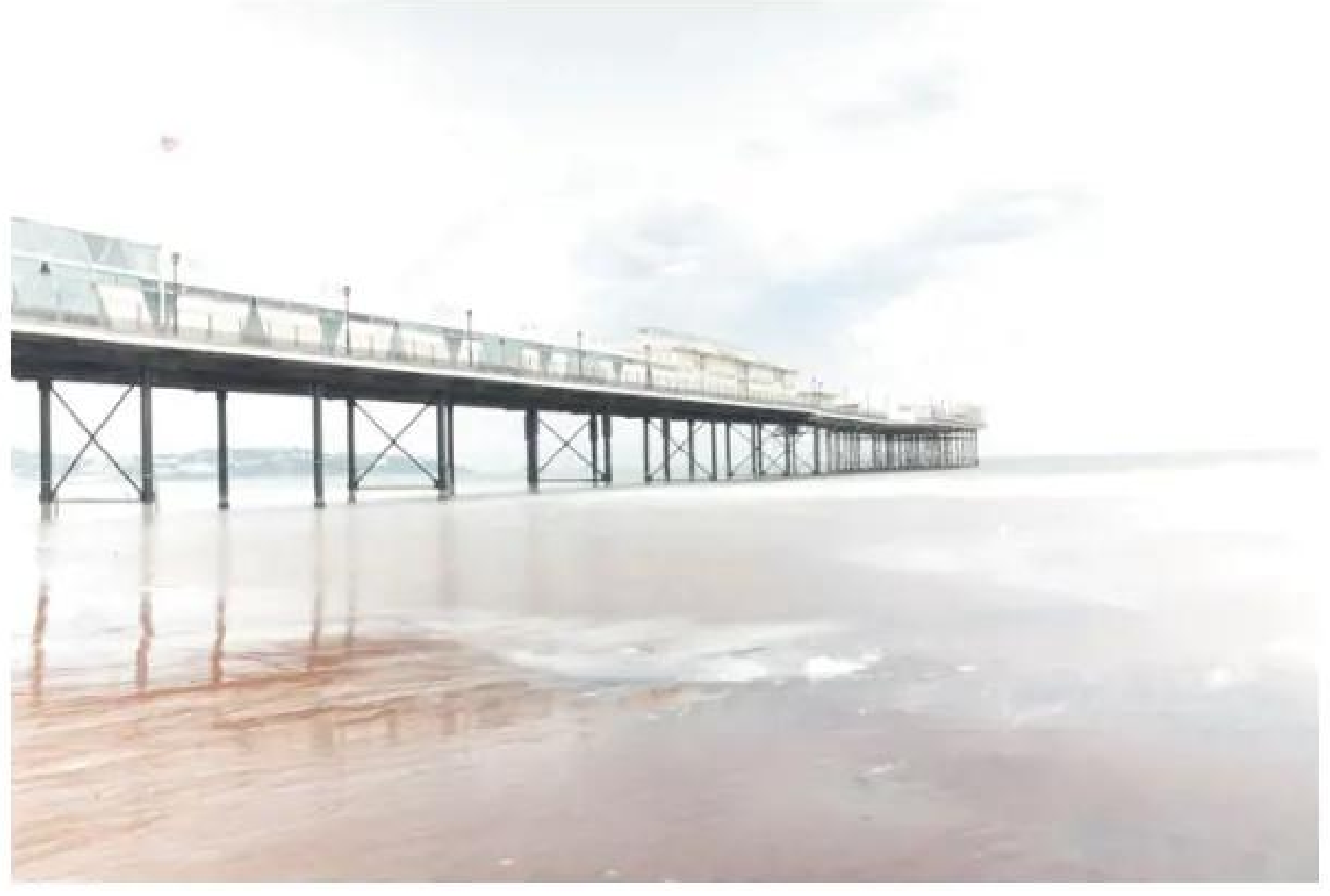
Learn how to shoot a long exposure

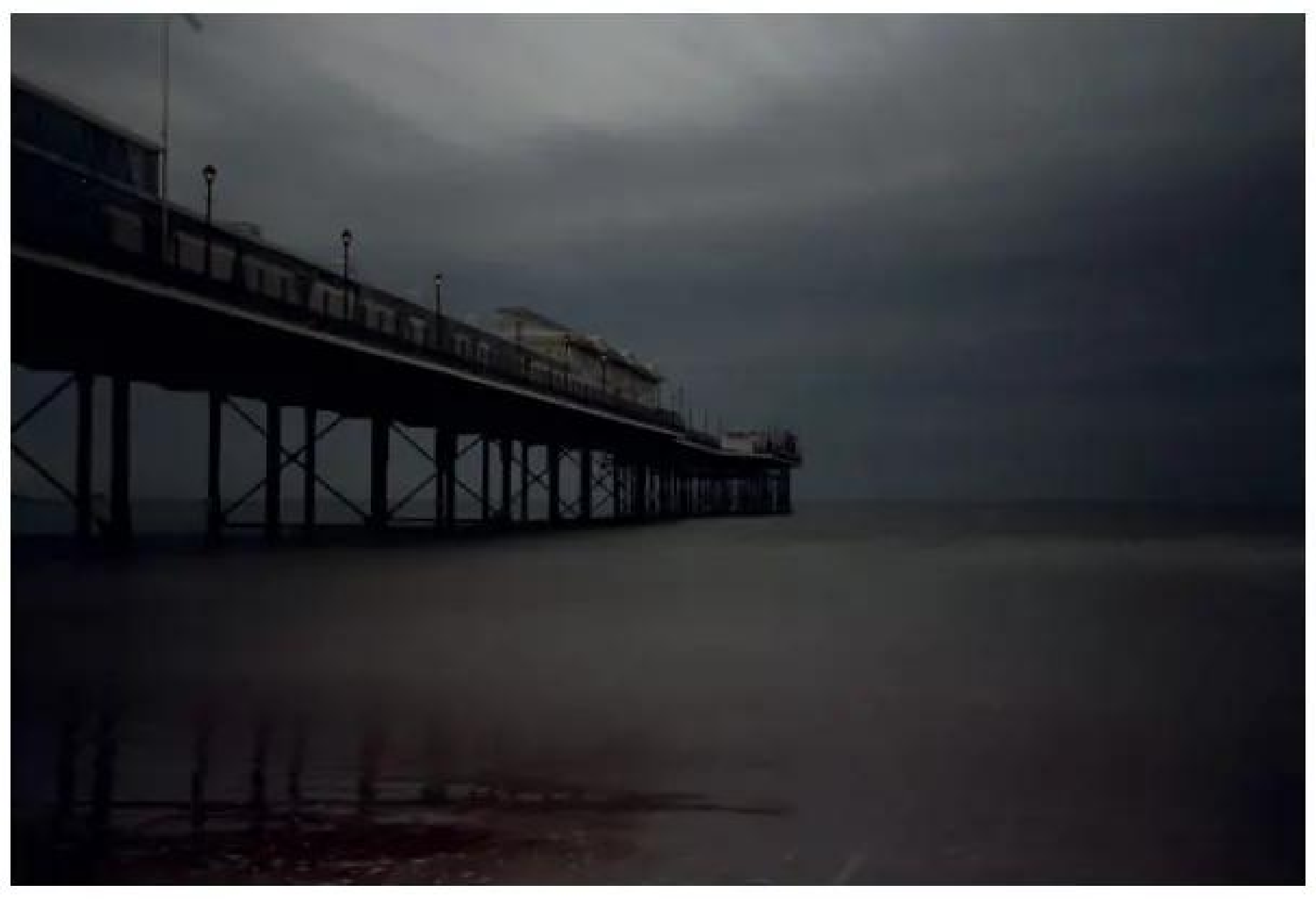


How to access Bulb

Depending on your camera model there are two different ways to access the Bulb mode. On some camera models it's accessed through the mode dial under B. On other models it's in the manual setting. To find it you have to first engage manual, then turn the command dial right down past thirty seconds to BULB.

Canon
Canon





Experiment with exposures

It's a bit of trial and error to get the exposure time right. So as a starting point try opening the shutter for one minute. Review the result and increase or reduce the exposure time as necessary. Remember that if the image is too light, you've over-exposed it, and you need less time. If it's too dark then it's under-exposed, and you need to increase the exposure time. Keep checking and tweaking the timing until you're happy with the results.

Use a tripod

You'll need to mount your camera on a tripod because you need to keep your camera still during the exposure or else you'll get very blurred results. Make sure your tripod is securely placed on the ground and all the clips are tightened before you start shooting.

Use a remote release

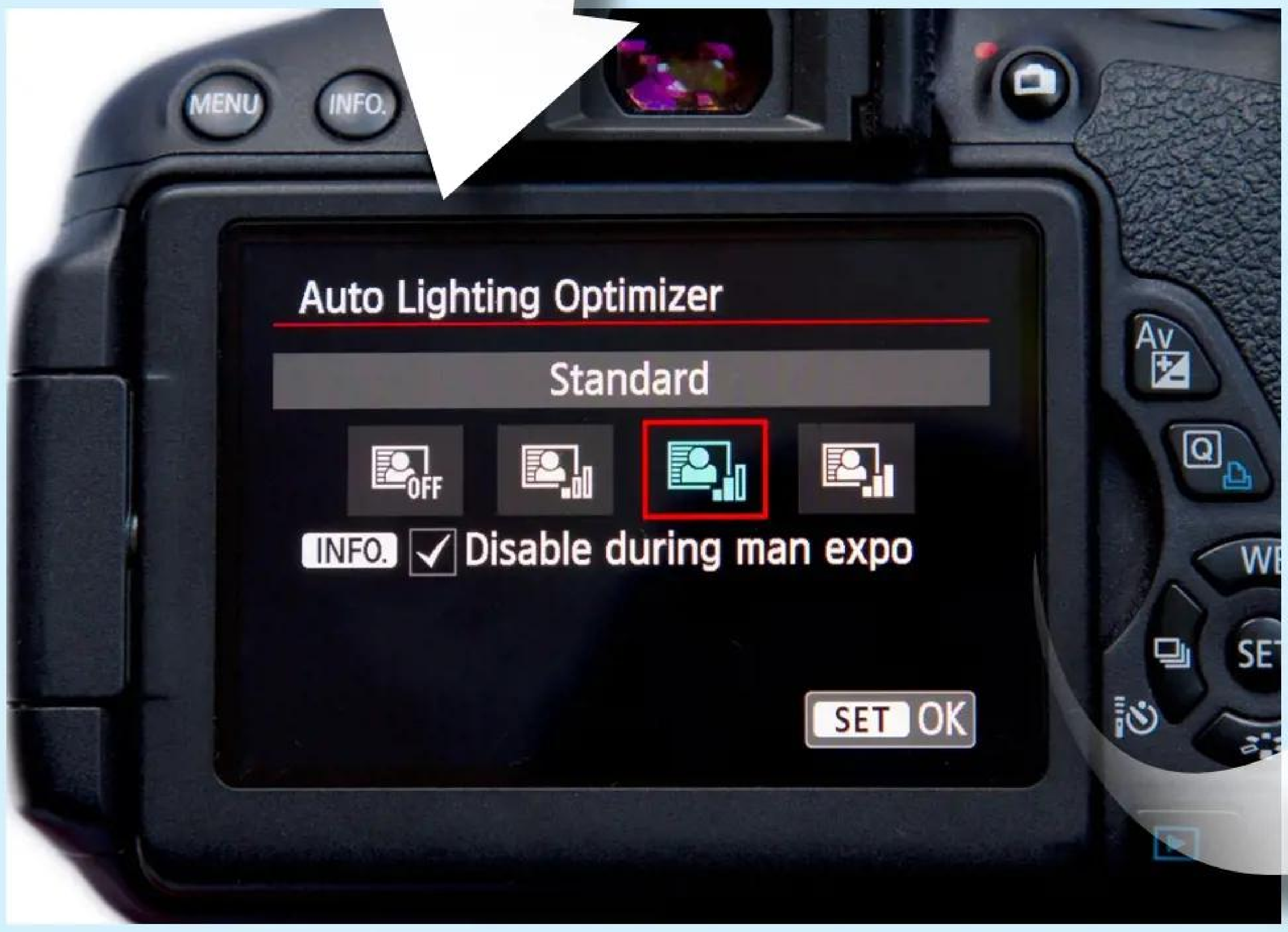
You'll find it much easier to use the Bulb mode if you have a remote shutter release. A gadget like this can be picked up for around £15/$20, and plugs into the side of the camera under the rubber flap. Canon DSLRs have two different fittings for the remote shutter release depending on whether your camera is a beginner or more advanced model. When purchasing, just make sure you have the correct fitting.

Auto Lighting Optimizer

Capture both the highlights and the shadows in a high-contrast scene, but only if you use the JPEG shooting option…

1 High-contrast scenes

The problem with shooting in high-contrast light is that it's hard to get an even exposure. Due to the vast difference between the readings of the highlights and shadows, your camera may capture dark heavy shadows with little or no detail, and over-exposed highlights. A feature that can help you out of this problem is the Auto Lighting Optimizer, but it's limited in the lengths it can go to. If the contrast in the scene is too vast then you're better off bracket-exposing the scene.

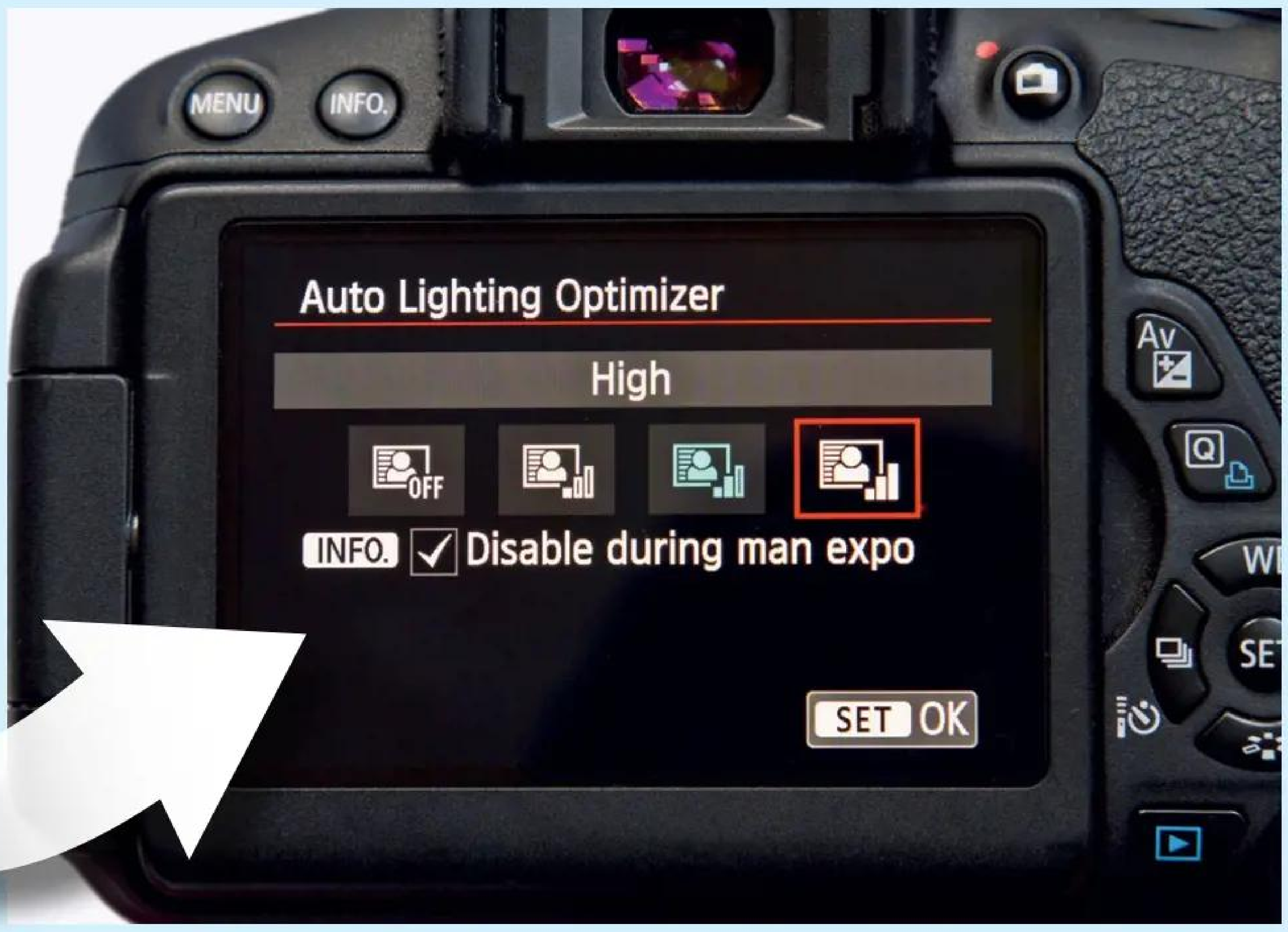


Auto Lighting Optimizer

Standard

INFO. ✓ Disable during man expo

SET OK



Auto Lighting Optimizer

High

INFO. ✓ Disable during man expo

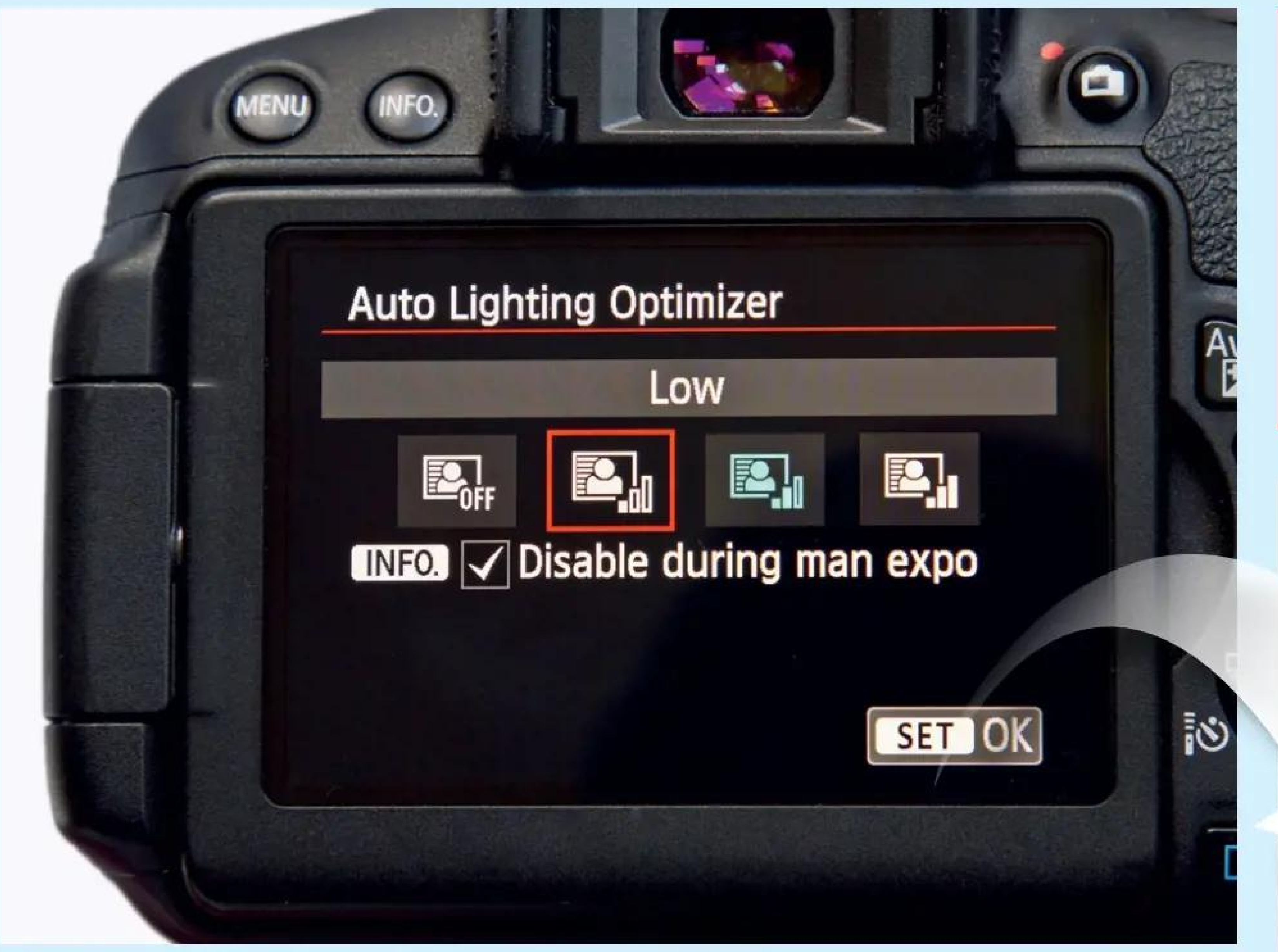
SET OK

2 The Standard setting

You'll find the Auto Lighting Optimizer feature in either the main camera's menu under Auto Lighting Optimizer, or on the back LCD screen by pressing the Q button and selecting the small icon that includes a person. The four options in the ALO menu are Disable, Low, Standard and High. Your Canon DSLR will be set to the Standard setting by default, and it will apply a medium amount of correction to the scene.

3 The High setting

If the ALO Standard setting is proving insufficient you can turn it up to High. The biggest problem you'll encounter with this setting is that your image is more susceptible to noise. This is a grain-like effect that reduces detail in the image. The noise will be more noticeable in the shadows and darker parts of the image, and when you start to zoom in. Only turn the setting up to high if the light in the scene is very strong and casting heavy shadows.



Auto Lighting Optimizer

Low

INFO. ☑ Disable during man expo

4 The Low setting

To get the best quality results, switch the ALO setting to Low or Disable. There's actually very little difference in the results on these two settings so it's best to switch it off altogether. Use this setting on days where the light is flat (overcast) but stick to the Standard setting if the sun comes out.

5 JPEG and raw

The effect of the Auto Lighting Optimizer feature will only be applied to the JPEG file. If you're shooting in raw you can still review the effect in-camera, but once uploaded to a computer it won't be recognised unless opened in Canon's free Digital Photo Professional software. This is because JPEG files are compressed image files whereas raw files are uncompressed. Raw files appear flat in appearance when you first open them on your computer, and you need to process them in a raw editor to get the best quality. ■

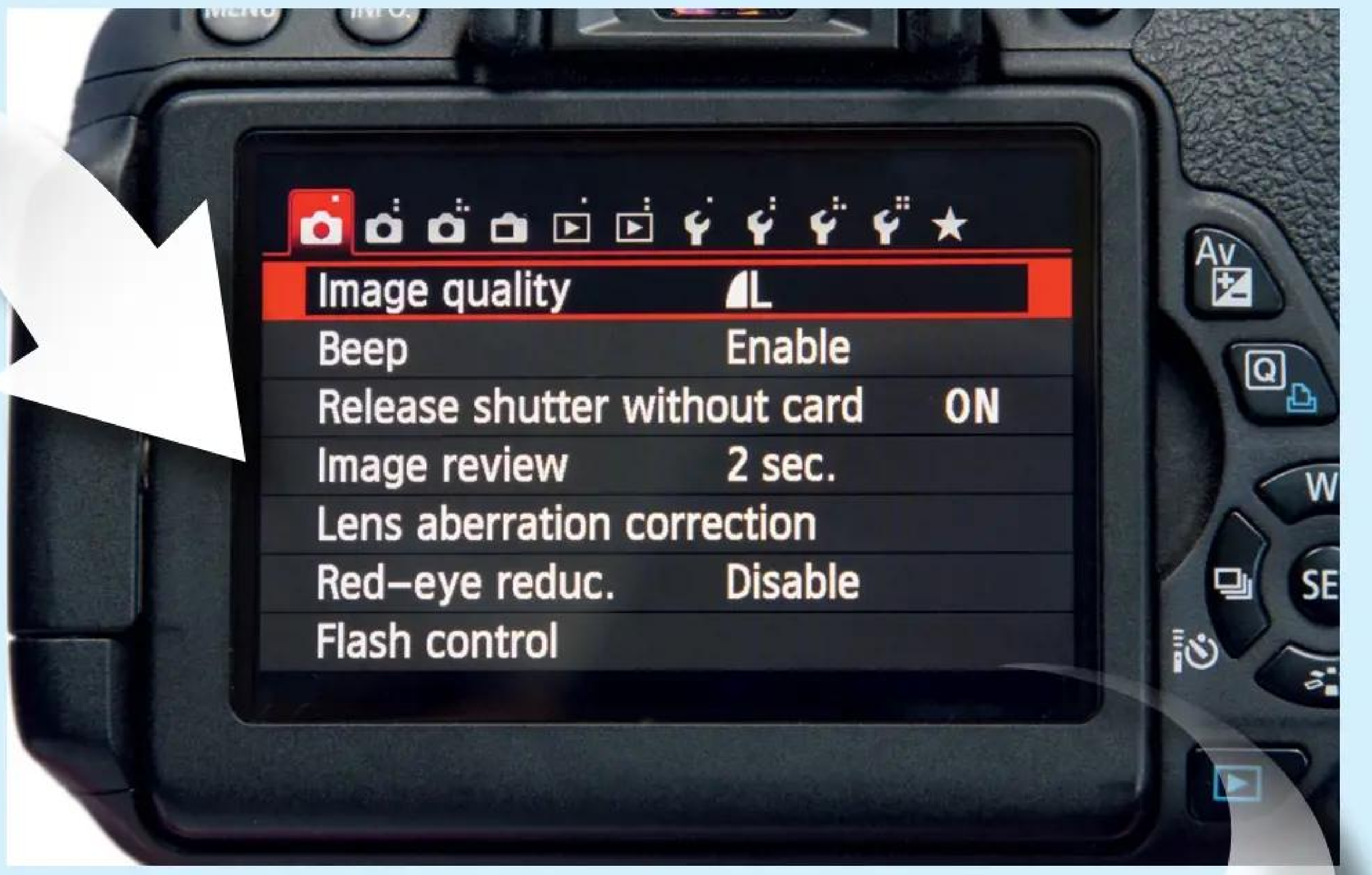


Image quality ◢L
Beep Enable
Release shutter without card ON
Image review 2 sec.
Lens aberration correction
Red-eye reduc. Disable
Flash control

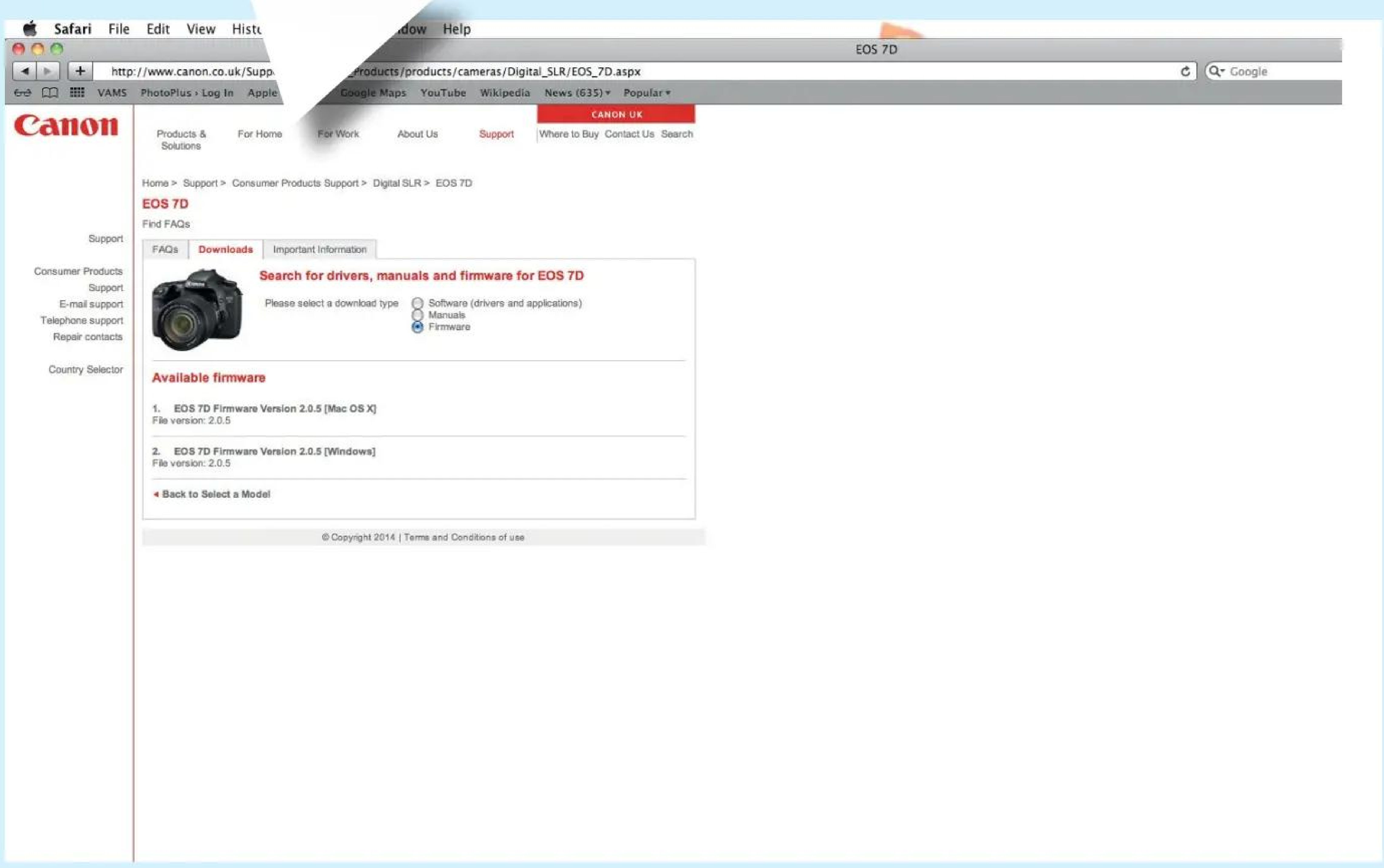
Update your DSLR's firmware

Keep your camera up to date by updating it with the latest firmware download

1 What is firmware?

A firmware installation can update many features and camera settings, from fixing bugs to generally making your camera perform better. Updating the firmware is easy, and it's free, but there are a few necessary steps to take before you begin. So let's get started.

Canon
EOS 7D
Canon


Safari File Edit View Hist… …dow Help
EOS 7D
http://www.canon.co.uk/Supp… …Products/products/cameras/Digital_SLR/EOS_7D.aspx
Google
VAMS PhotoPlus › Log In Apple … Google Maps YouTube Wikipedia News (635) ▾ Popular ▾
Canon
CANON UK
Products & Solutions For Home For Work About Us Support Where to Buy Contact Us Search
Home > Support > Consumer Products Support > Digital SLR > EOS 7D
Support
Consumer Products Support
E-mail support
Telephone support
Repair contacts
Country Selector
FAQs Downloads Important Information
◂ Back to Select a Model
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EOS 7D

Find FAQs

Search for drivers, manuals and firmware for EOS 7D

Please select a download type ○ Software (drivers and applications) ○ Manuals ● Firmware

Available firmware

1. EOS 7D Firmware Version 2.0.5 [Mac OS X]
File version: 2.0.5

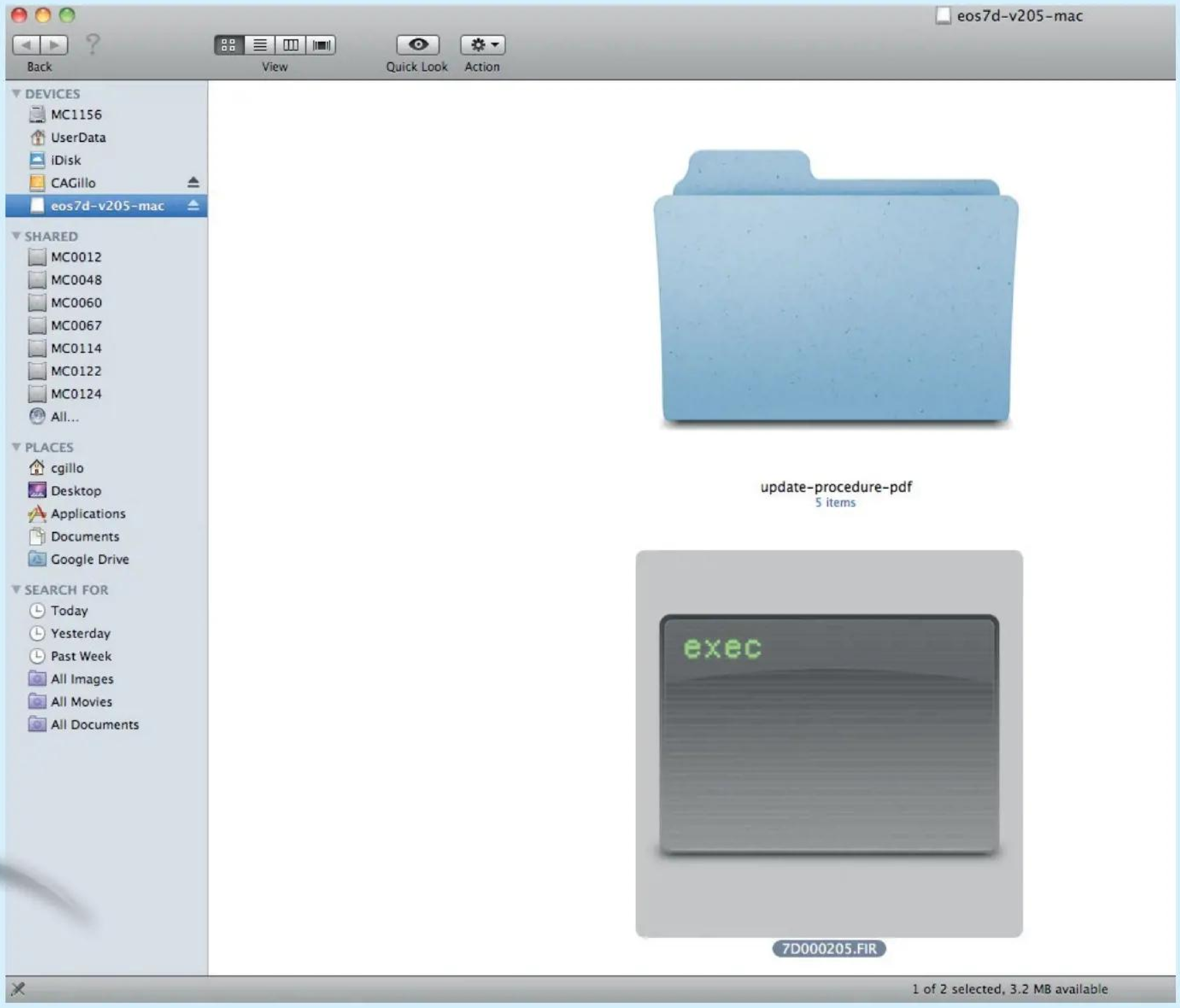
2. EOS 7D Firmware Version 2.0.5 [Windows]
File version: 2.0.5

2 Download the software

Go to the Canon website at www.canon.co.uk and select your camera model by going to Products and Solutions›EOS Digital SLR and Compact System cameras. Once you've found your camera model, click the Support & Download link on the right-hand side of the page. Click Firmware, then download the right version for your computer. Scroll down to the bottom of the page and click Accept & Download.

3 Extract firmware

Once the file is downloaded you’ll need to extract it otherwise your camera won’t recognise it. Double click the folder to do this. You’ll notice a strange looking file name that ends in .FIR. This is the firmware file that you need to copy onto your memory card.


eos7d-v205-mac
Back
View
Quick Look
Action
DEVICES
MC1156
UserData
iDisk
CAGillo
eos7d-v205-mac
SHARED
MC0012
MC0048
MC0060
MC0067
MC0114
MC0122
MC0124
All...
PLACES
cgillo
Desktop
Applications
Documents
Google Drive
SEARCH FOR
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All Movies
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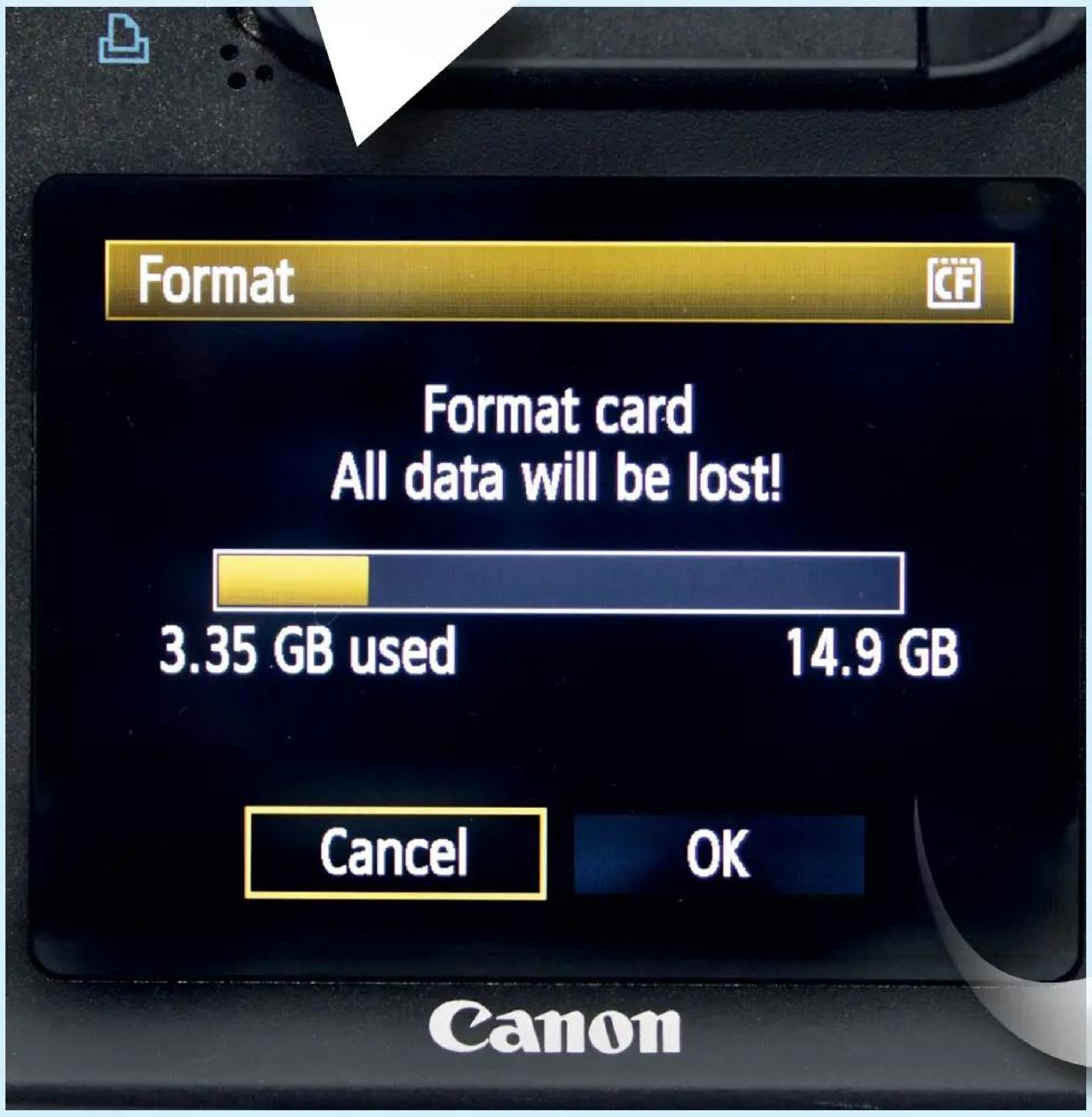
5 items
exec
7D000205.FIR
1 of 2 selected, 3.2 MB available



Format

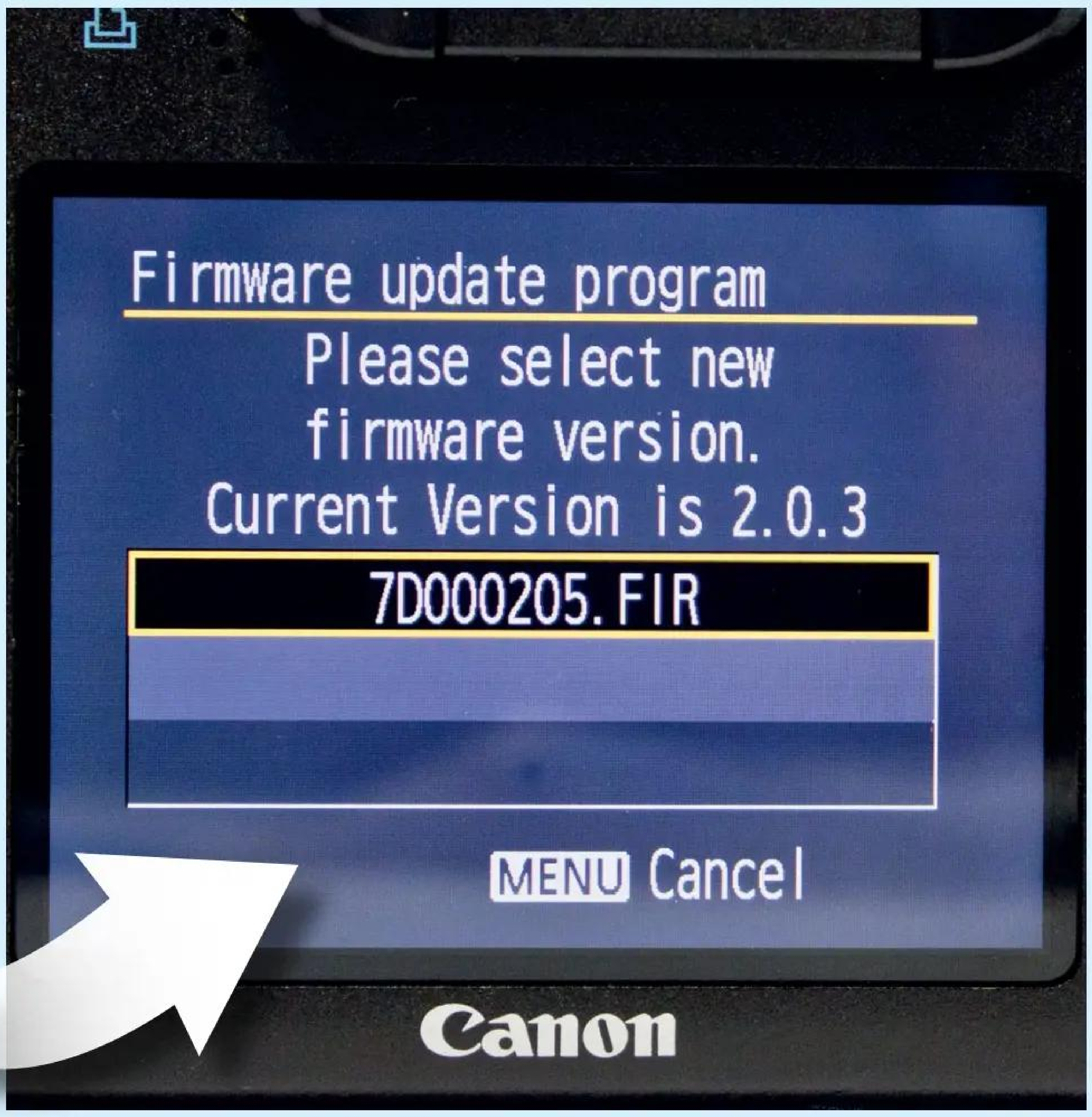
Format card
All data will be lost!

3.35 GB used 14.9 GB

Cancel
OK
Canon

4 Format your memory card

Before you copy the file to your camera, you need to format your memory card in your camera. Insert the card and press the Menu button. Select Format in the yellow camera setup section. Remember though that formatting your memory card wipes it completely clean, so make sure you’ve saved any images you want from it before you format it.



Firmware update program
Please select new
firmware version.
Current Version is 2.0.3
7D000205.FIR

MENU Cancel
Canon

5 Transfer the firmware

Retrieve your memory card from your camera and plug it back into your computer. Copy the extracted firmware file into the first window that appears when you open the memory card on your computer. If you place it within the DCIM folder, you camera may not be able to find it when you plug your memory card back in.

Install the firmware

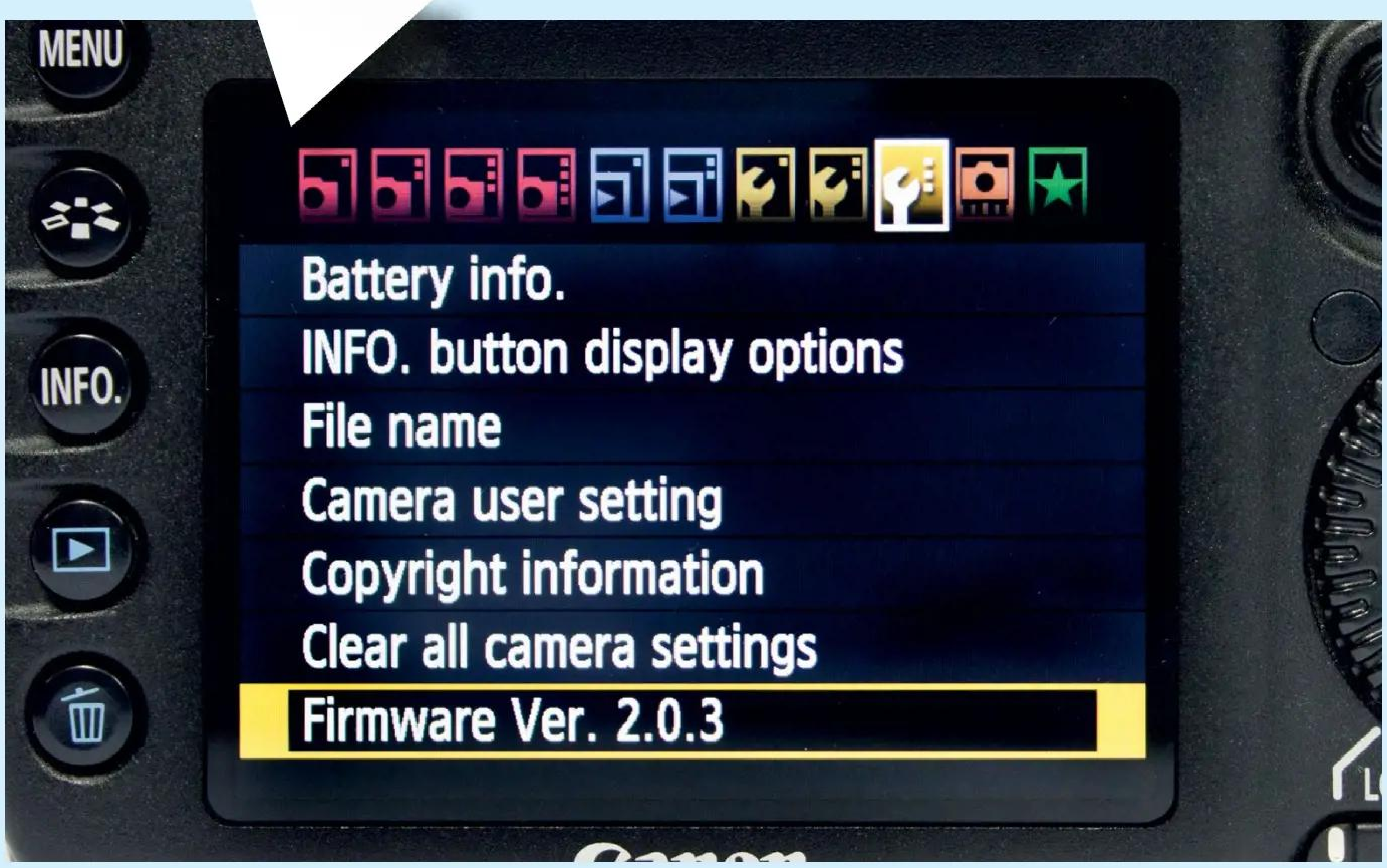
Complete the firmware update by copying it to your camera and installing it

6 Put your SLR in program mode

Insert your memory card back into your DSLR and switch it on. You need to be in one of the creative shooting modes to be able to perform the next step of the update. For this example we're simply going to set the mode dial to program.

Scan For Free Magazines

B
M
Av
Tv
P
CA
OFF
ON

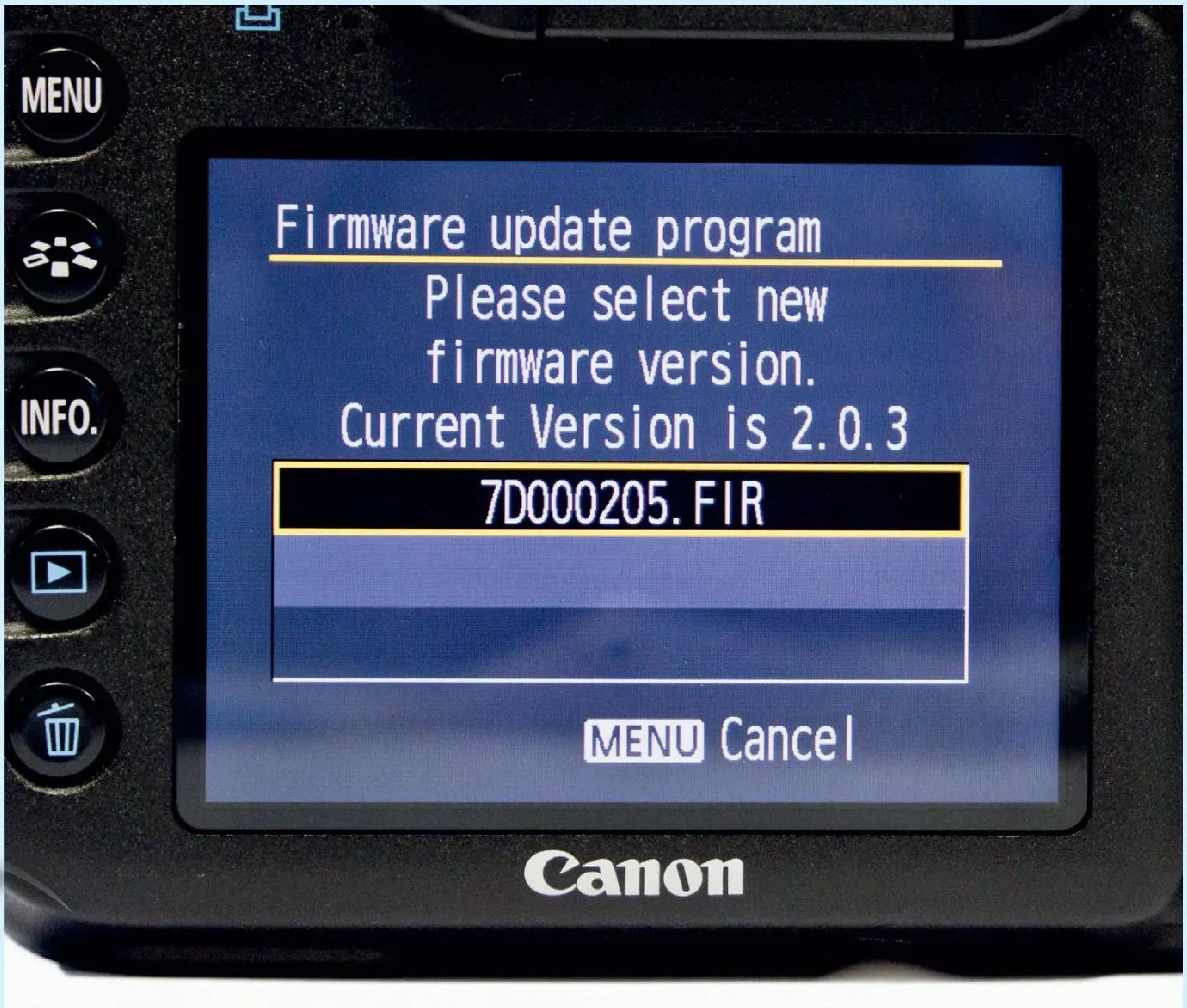

MENU
INFO.
Battery info.
INFO. button display options
File name
Camera user setting
Copyright information
Clear all camera settings
Firmware Ver. 2.0.3

7 Go to the Firmware menu

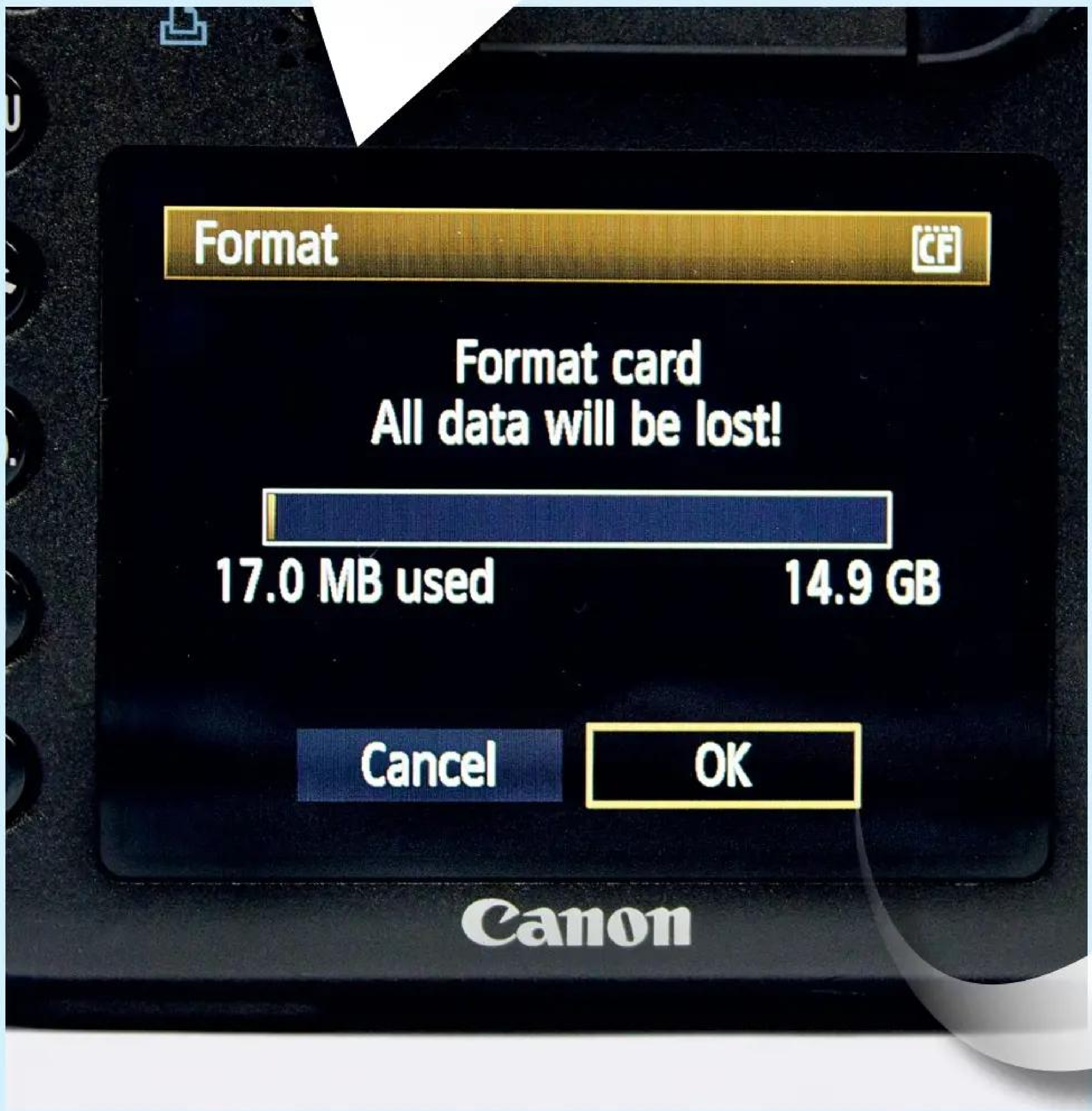
Press the Menu button and head into the yellow set up section. Use the multi-controller to navigate right and left and up and down. Find Firmware in the menu system and select it. After you've completed the installation, it will update this firmware option with the installed version number.

8 Start installation

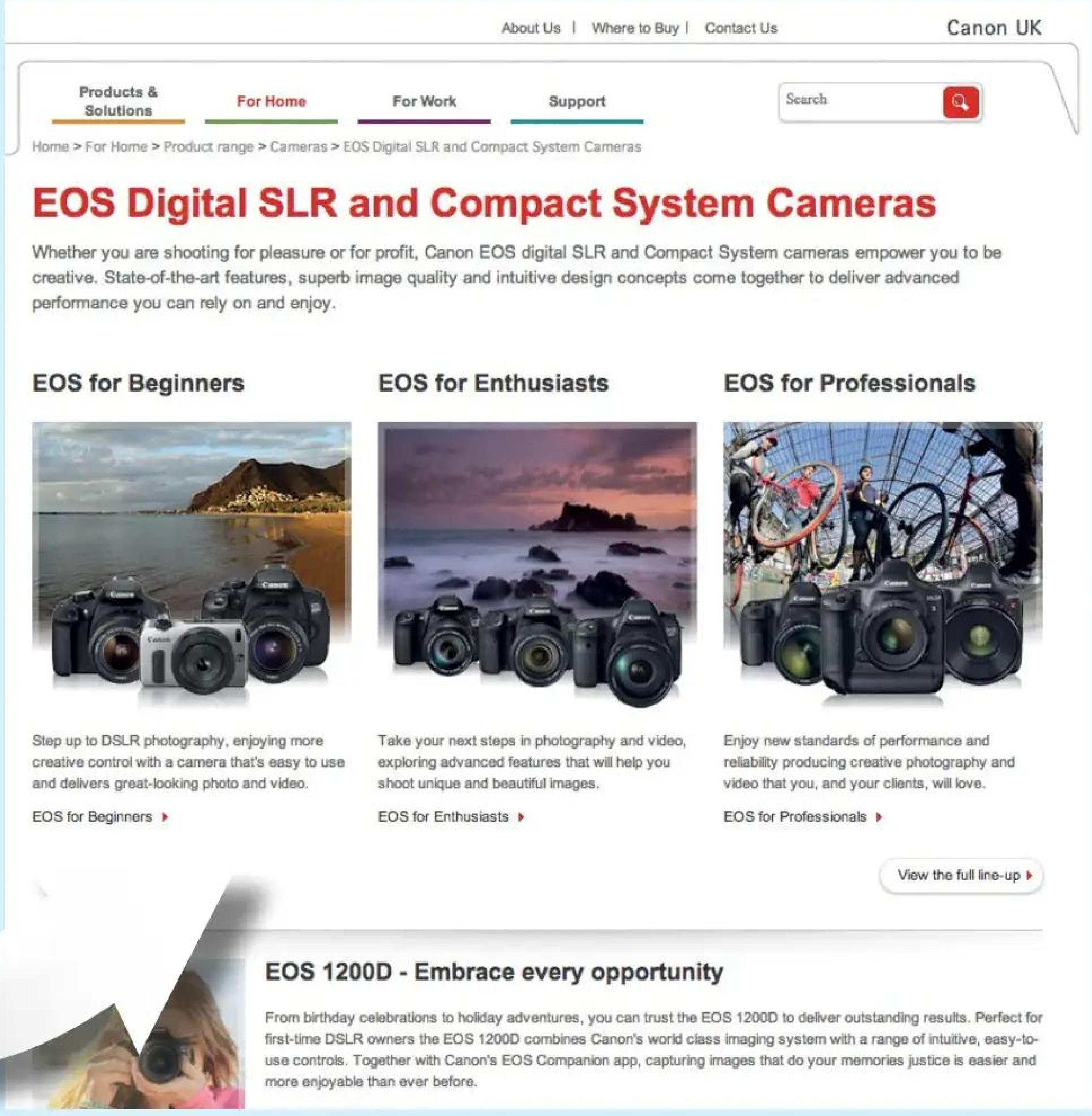
Depending on your camera it may ask you if you want to update the camera or lens firmware. Select the camera in this case. Keep pressing Set and following the on-screen instructions until your camera starts updating. It will take a while so be patient, and be careful not to press any buttons during the process.



Firmware update program
Please select new firmware version.
Current Version is 2.0.3
7D000205.FIR
MENU Cancel



Format
Format card
All data will be lost!
17.0 MB used 14.9 GB
Cancel OK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EOS Digital SLR and Compact System Cameras

Whether you are shooting for pleasure or for profit, Canon EOS digital SLR and Compact System cameras empower you to be creative. State-of-the-art features, superb image quality and intuitive design concepts come together to deliver advanced performance you can rely on and enjoy.

EOS for Beginners

Step up to DSLR photography, enjoying more creative control with a camera that's easy to use and delivers great-looking photo and video.

EOS for Beginners ▸

EOS for Enthusiasts

Take your next steps in photography and video, exploring advanced features that will help you shoot unique and beautiful images.

EOS for Enthusiasts ▸

EOS for Professionals

Enjoy new standards of performance and reliability producing creative photography and video that you, and your clients, will love.

EOS for Professionals ▸

EOS 1200D - Embrace every opportunity

From birthday celebrations to holiday adventures, you can trust the EOS 1200D to deliver outstanding results. Perfect for first-time DSLR owners the EOS 1200D combines Canon's world class imaging system with a range of intuitive, easy-to-use controls. Together with Canon's EOS Companion app, capturing images that do your memories justice is easier and more enjoyable than ever before.

9 Format your memory card again

Once complete, your camera will let you know it's finished the job. However, before you start shooting it's important to format you memory card once more to wipe the firmware file from the memory card. Go to Menu›Format and press OK to complete the job. And that's it. You've updated your camera's firmware.

10 A word of warning...

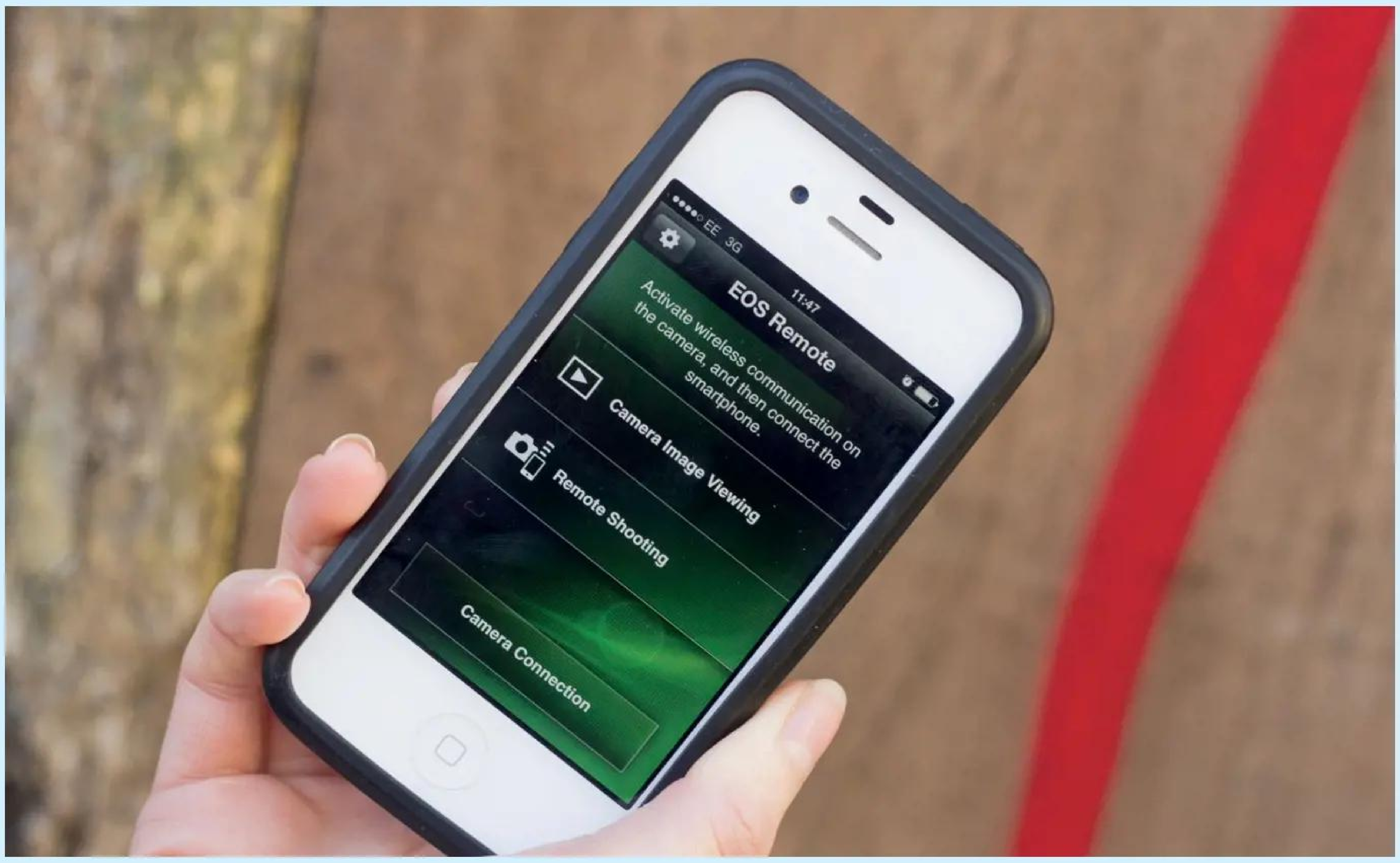
One word of warning, however. Before you begin, make sure you've fully charged your battery, because a fail in power during the installation could damage your DSLR. You should now be able to enjoy your new camera features. It's worth checking the Canon website regularly to see what new firmware is available.

Wi-Fi, GPS and HDR

Discover five of the most exciting new features of the latest Canon DSLRs

1 HDR

HDR stands for high dynamic range, and is a popular technique with landscape photographers. The feature works by taking three images in succession of the same scene. It's exposing for the highlights, midtones and shadows. The camera then processes these three images into one final result. It's great when faced with a high-contrast scene. The Canon cameras that have an HDR mode include the Canon 5D MK III and 6D. The 650D and the 700D include a HDR Backlight Control feature. It's also worth noting that you can create the HDR effect in Canon's free DPP software. It's best to use a tripod when shooting three different exposures of the same scene so that the images match up.

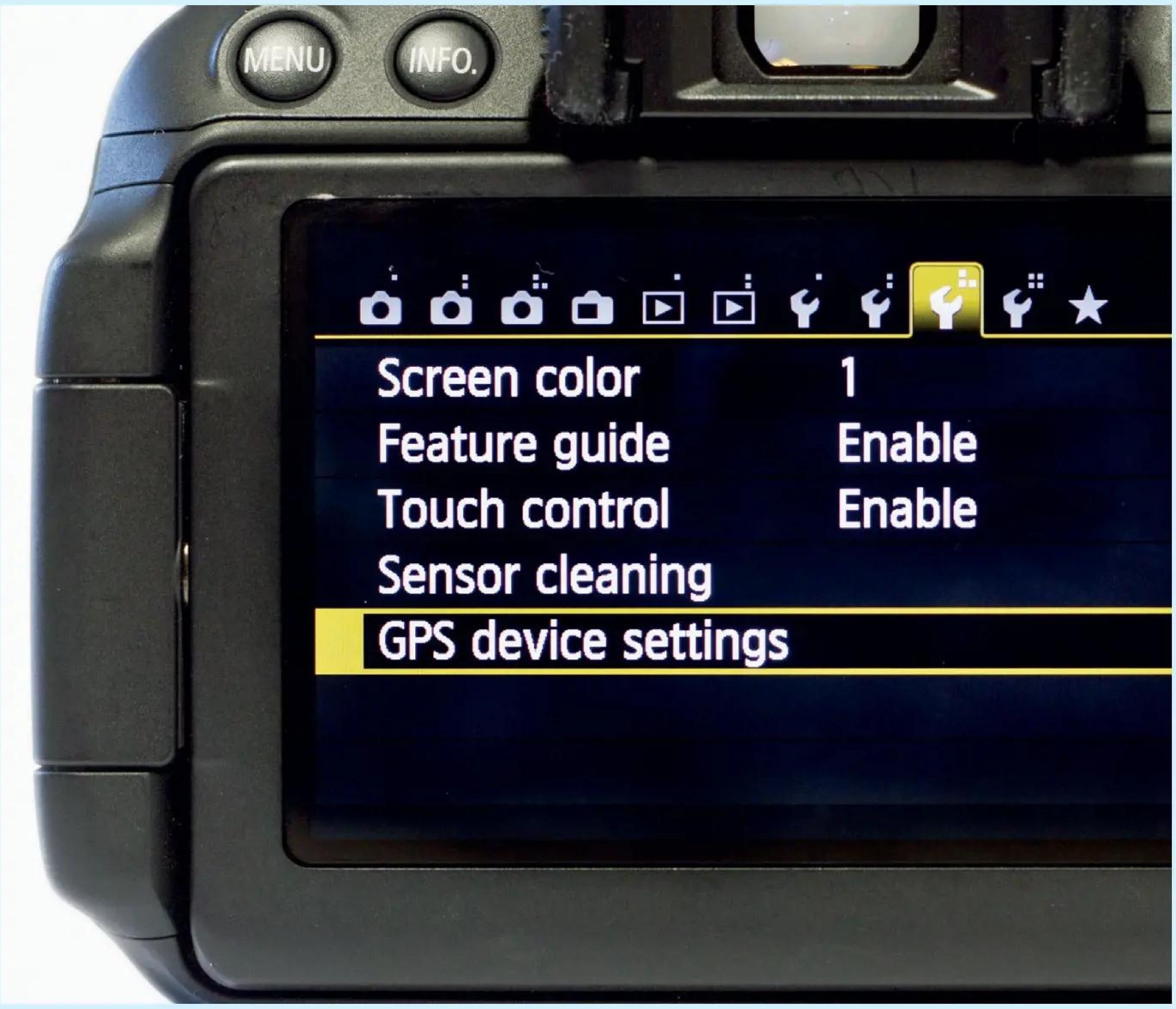

EE 3G
11:47
EOS Remote
Activate wireless communication on the camera, and then connect the smartphone.
Camera Image Viewing
Remote Shooting
Camera Connection

2 Wi-Fi and remote shooting

One of the latest Canon DSLR features to be announced is Wi-Fi. Currently, the Canon EOS 6D and 70D include it. Once you've enabled it in the menus, you can connect to a network, set up remote shooting from your phone using the EOS Remote app, and transfer images from the camera wirelessly.

3 Global positioning system (GPS)

GPS is another feature that has found it's way into Canon DSLRs. It's great for those on the go who need to know the exact location where their images were taken. Some Canon DSLRs such as the 6D include an internal GPS device, whereas others have the option to attach an external device to the camera.



Screen color 1
Feature guide Enable
Touch control Enable
Sensor cleaning
GPS device settings

4 Creative Filters

If you want to produce something a little out of the ordinary then you can add a Creative Filter effect to your image. To find this setting head to the playback section of the main menu and select Creative Filters. Navigate to the image you wish to process, press Set and then follow the on-screen instructions to add the effect to your image. Popular options include the miniature effect and the retro toy camera look.

5 Touchscreen shutter

The Canon EOS 700D and 650D both include touchscreen technology, and have the option to fire the shutter with touch-sensitive technology. It's also possible to pin the main focal point anywhere on the screen by a simple touch. The LCD screens on these models are vari-angled, meaning you can alter the angle and position of the screen away from the camera body when shooting from an awkward position. ■

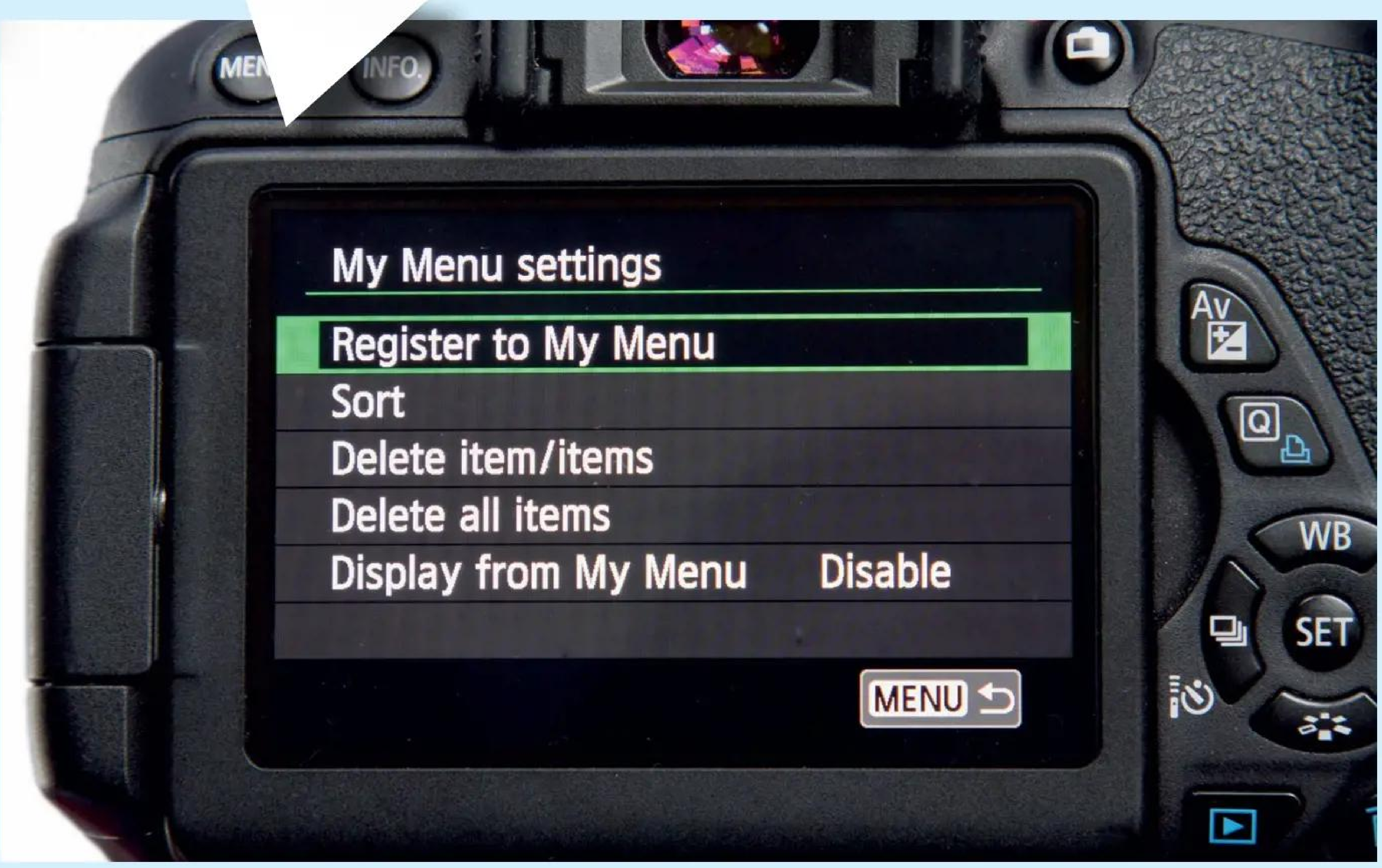
Customise your camera

Put all your favourite settings in one place with the My Menu feature

1 What is My Menu?

Once you start to feel more comfortable using your DSLR, you can begin to customise it. My Menu enables you to quickly find features and settings by listing them in a bespoke manner. To use My Menu you need to be in one of the creative shooting modes (P, Av, Tv or M).

ISO
SCN
M
Av
Tv
P
CA
ON
OFF



My Menu settings

Register to My Menu

Sort

Delete item/items

Delete all items

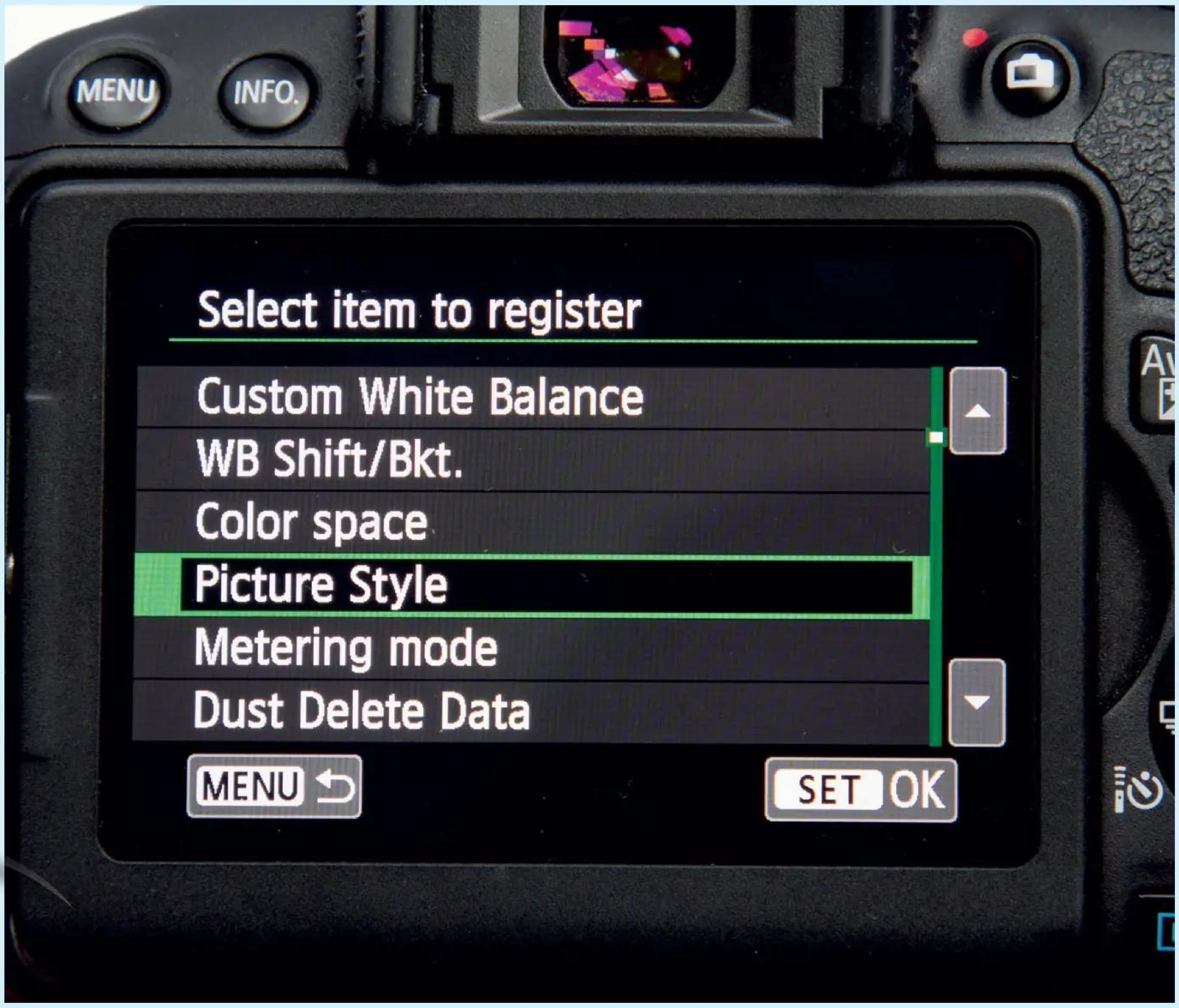
Display from My Menu Disable

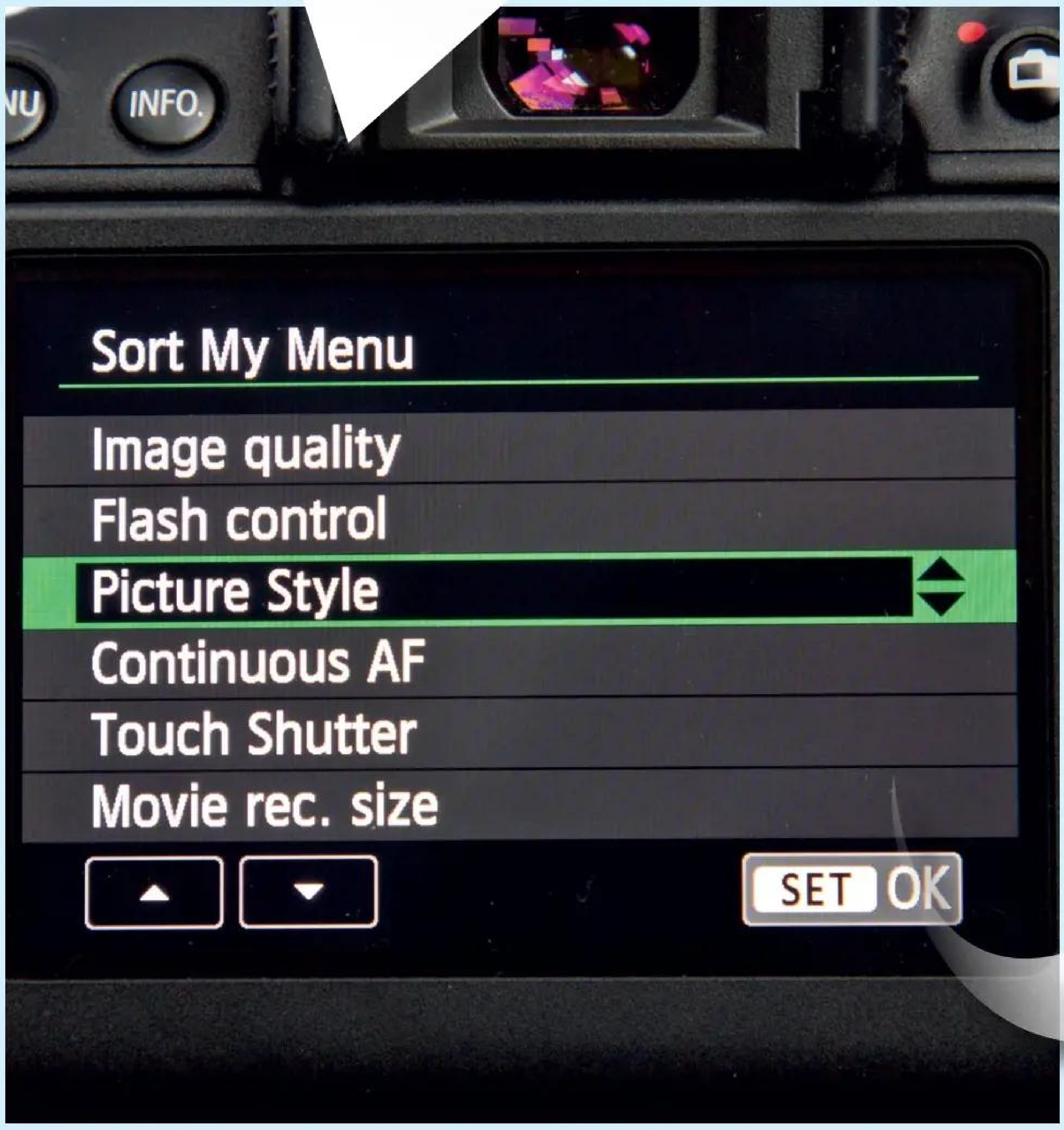
2 Set up My Menu

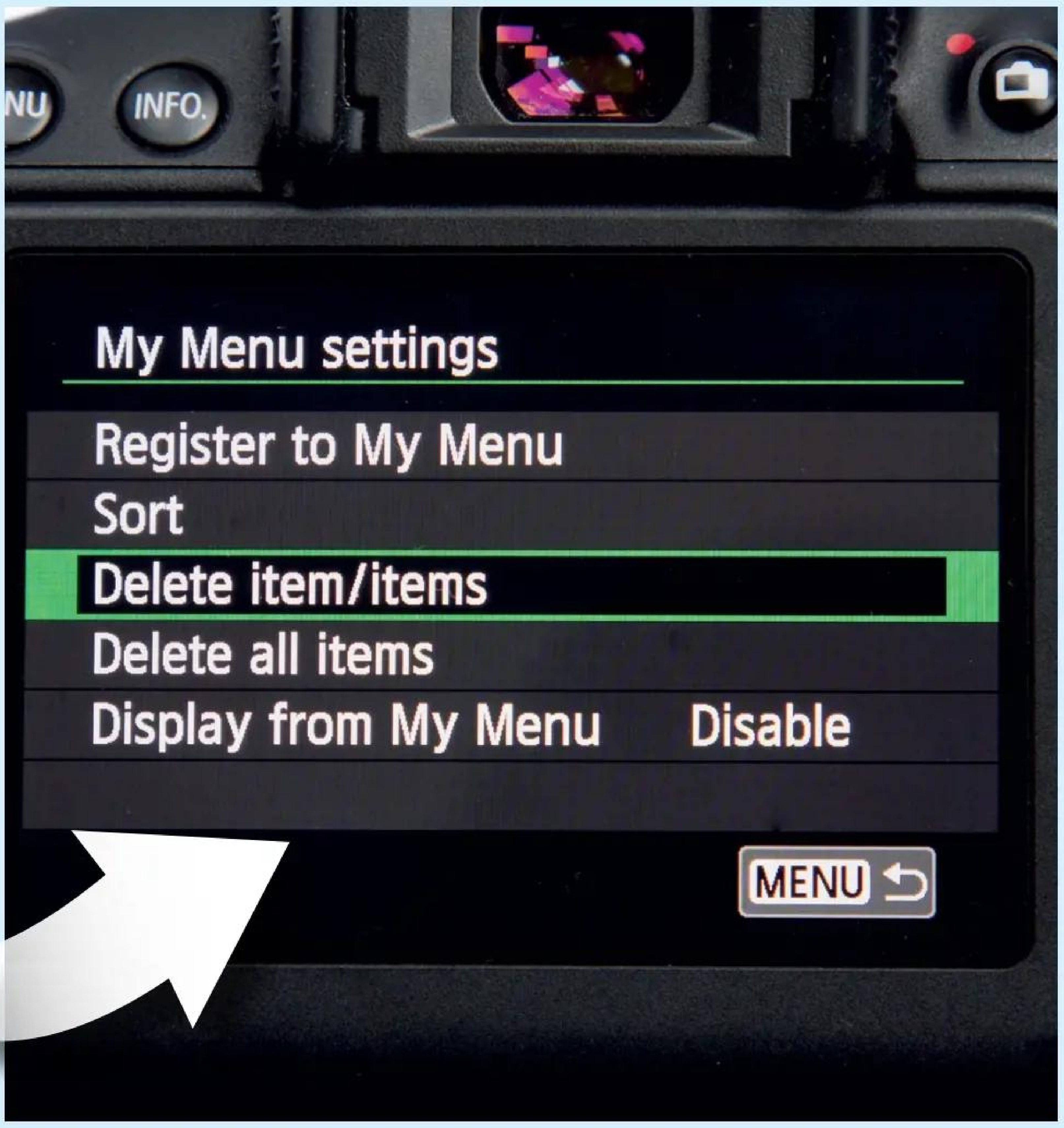
To set up My Menu, press the Menu button and navigate to the green star section on the far right-hand side. Click My Menu Settings, then Register to My Menu. From here you can select which features you want quick access to.

3 Select features

You can include up to six features in the list. If you scroll down, you can see all of the settings and features included in the Main Menu of your camera. To select one, press Set and then add it to My Menu. Press Set again to confirm the selection. You can now access them quickly in the main green section.


MENU
INFO.
Select item to register
Custom White Balance
WB Shift/Bkt.
Color space
Picture Style
Metering mode
Dust Delete Data
MENU
SET OK


INFO.
Sort My Menu
Image quality
Flash control
Picture Style
Continuous AF
Touch Shutter
Movie rec. size
SET OK


INFO.
My Menu settings
Register to My Menu
Sort
Delete item/items
Delete all items
Display from My Menu Disable
MENU

4 Sort the features

We also have the option to rearrange the items in the list by choosing the Sort option. Press Set to select and then move the feature to the new desired spot with the up and down keys of the back-panel multi-controller. When it's in the right spot, press the Set button again to confirm.

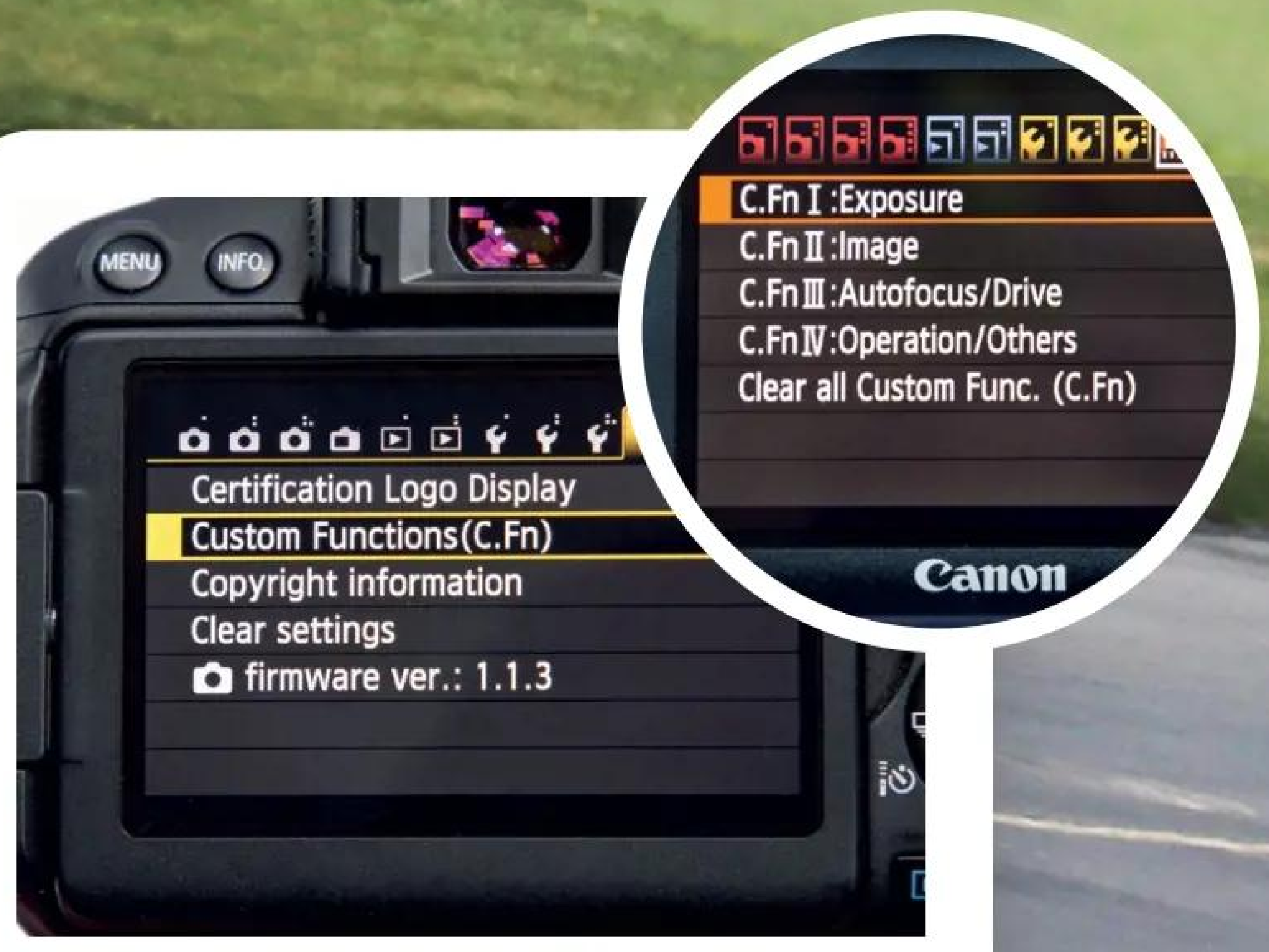
5 Delete features

If you want to remove one or more of the features from the My Menu list to make way for an alternative selection of features, you can either delete an item individually by selecting the Delete Item/Items option, or you can select Delete all items, and start again.

Custom Functions

Discover how to customise your DSLR further to suit your shooting style

Every photographer likes to use different camera settings, and control their DSLRs in ways they feel comfortable. You can adjust many of the preset default options that your DSLR has set for you. It's best to get to grips with the basic layout and features of your Canon DSLR before you do this. That way you'll already be familiar with your camera and the style of shooting you want to undertake. For example, if you're a landscape photographer then you're going to want to set your camera up very differently to a sports photographer or a portrait photographer. Over the next few pages we're going to show you some of the more popular custom settings and the necessary steps you need to take to make these alterations. We're also going to show you how to set your camera back to the default factory settings, just in case you want to start afresh.

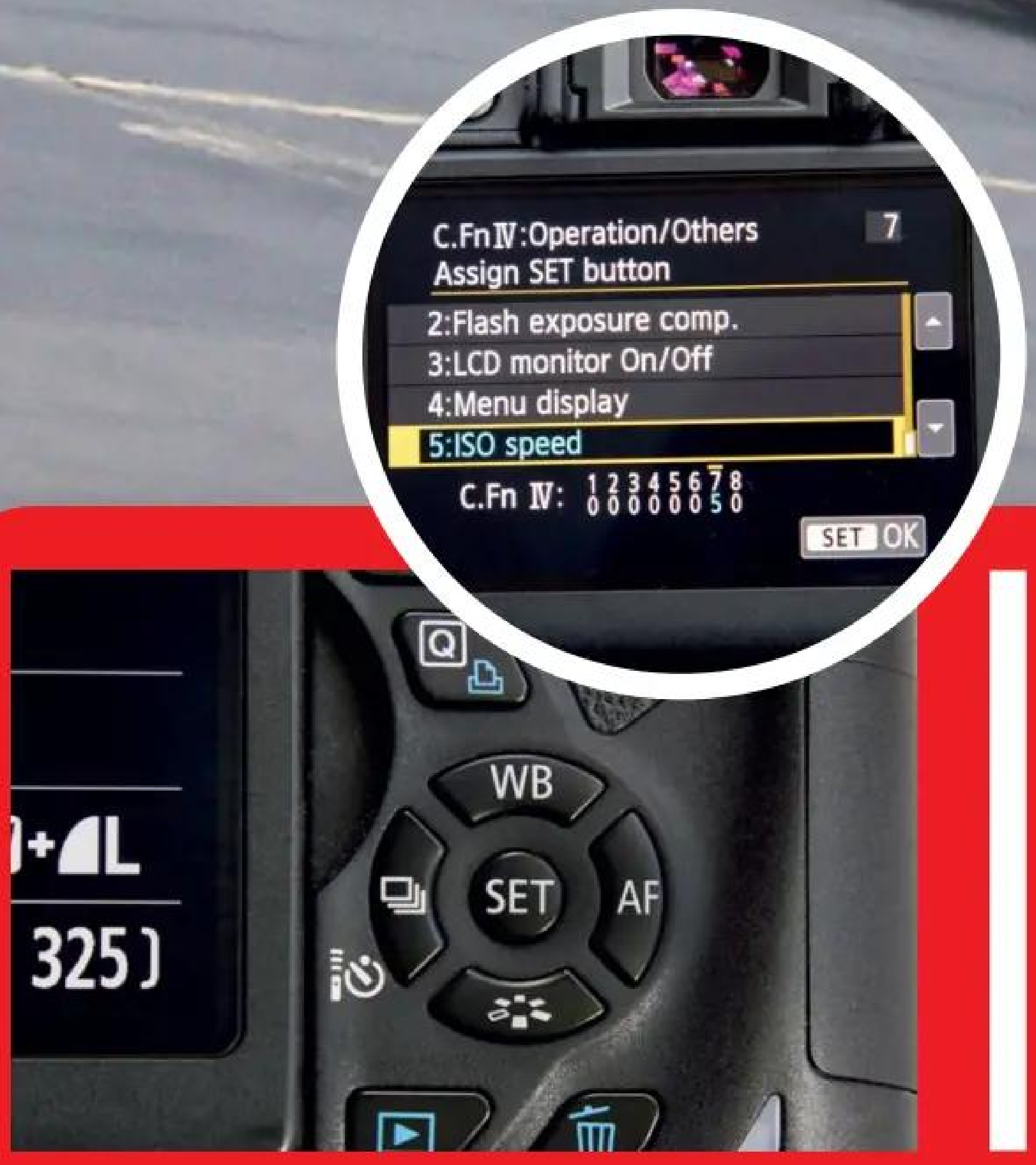


Certification Logo Display
Custom Functions(C.Fn)
Copyright information
Clear settings
firmware ver.: 1.1.3

C.Fn I :Exposure
C.Fn II :Image
C.Fn III :Autofocus/Drive
C.Fn IV :Operation/Others
Clear all Custom Func. (C.Fn)

Where to start?

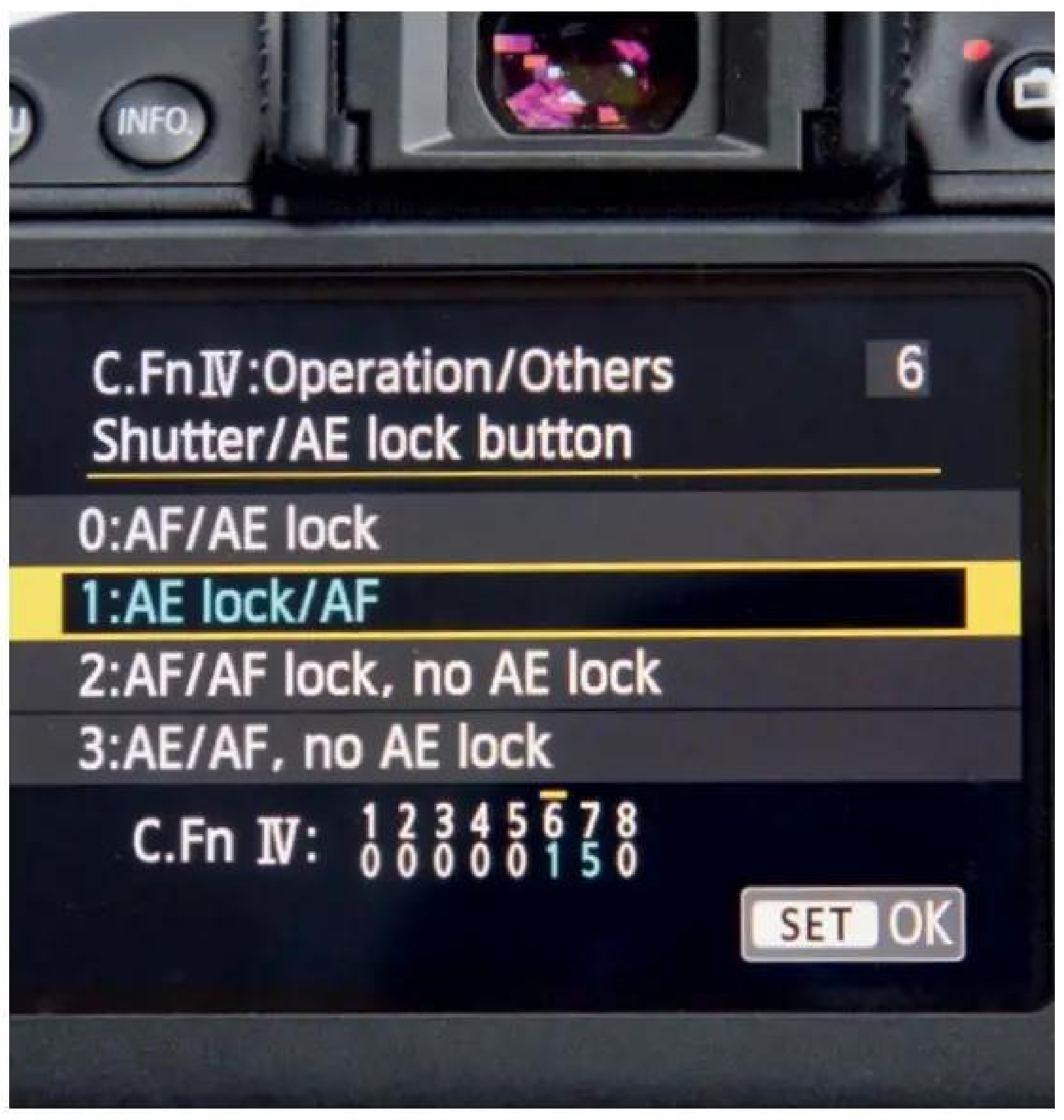
If you own a beginner model you'll find all of the custom camera settings in the yellow setup menu. Look for the Custom Functions option. If you have a more advanced model then you have an extra coloured orange menu section, where you'll find all of your custom controls. You can't customise your camera if you are in the fully automatic shooting mode or any of the scene modes. You need to be in one of the creative shooting modes (P, Av, Tv or M) to access this section of the menu.



C.Fn IV:Operation/Others 7
Assign SET button
2:Flash exposure comp.
3:LCD monitor On/Off
4:Menu display
5:ISO speed
C.Fn IV: 1 2 3 4 5 6 7 8
0 0 0 0 0 0 5 0
SET OK

The Set button

If you want to change the Set button to perform another function, you can do so. It's handy to set it up as an ISO shortcut because this is a setting you'll regularly alter, and the ISO shortcut button is often awkwardly placed on the top panel of the camera.



C.Fn IV:Operation/Others 6
Shutter/AE lock button
0:AF/AE lock
1:AE lock/AF
2:AF/AF lock, no AE lock
3:AE/AF, no AE lock
C.Fn IV: 12345678 00000150

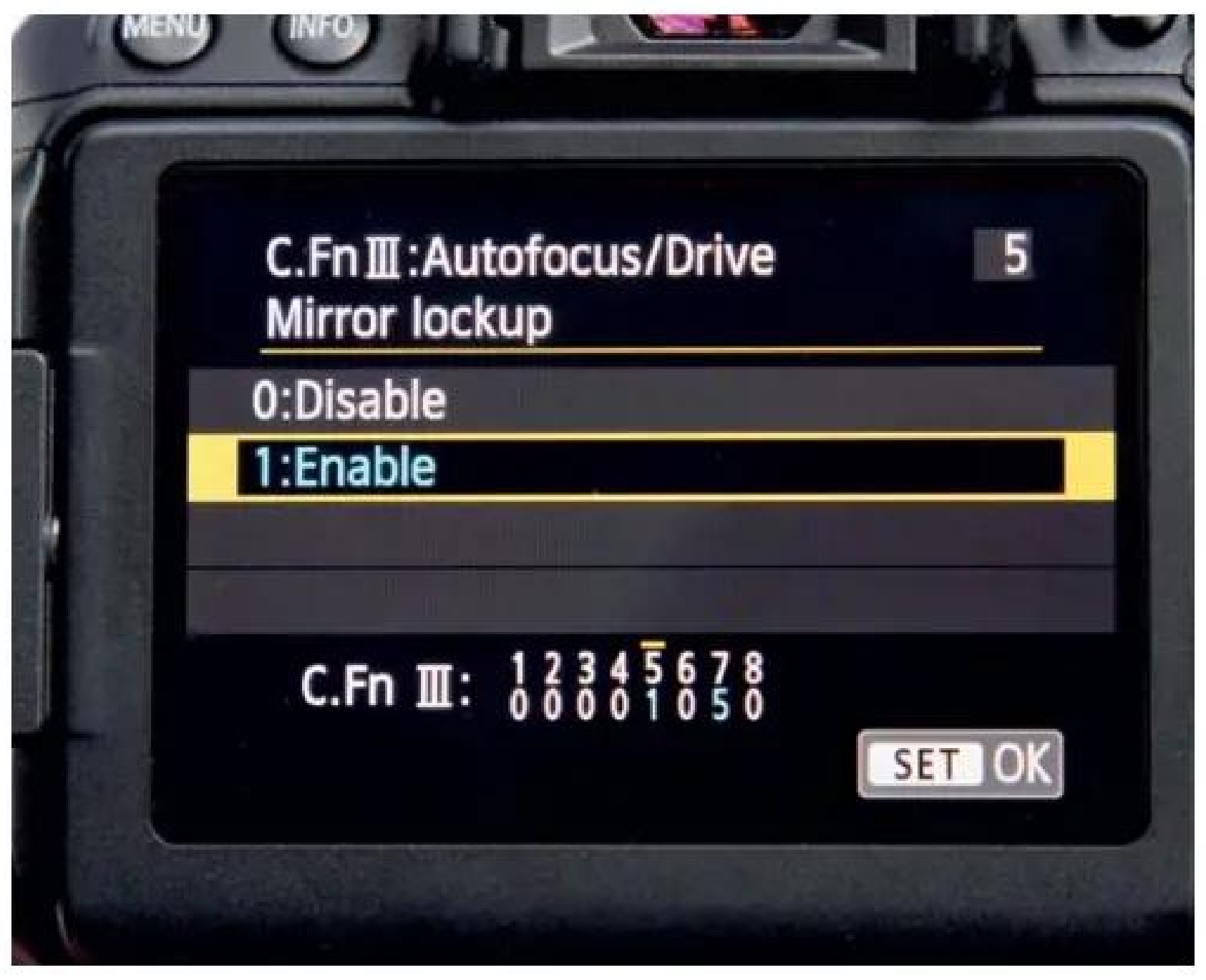
Back button focusing

Many photographers like to set the AF-ON button, or the AE Lock button that has the Star symbol above it, to perform the autofocus function. Instead of half pressing the shutter-release button to focus, you use the back button instead. The shutter release on this setting won't focus the image. If you have a beginner model, go to the Shutter/AE lock button option in the Custom camera menu and select AE Lock/AF. If you're using a more advanced model, you have to find the Operation/others menu and under Custom Controls in the Operation/Others menu, set the first option from the list to Metering Start. The AF-On button is now the only autofocus control.

C.Fn I :Exposure
Exposure level increments
0:1/3-stop
1:1/2-stop
C.Fn I: 12345678 01000000

Exposure level increments

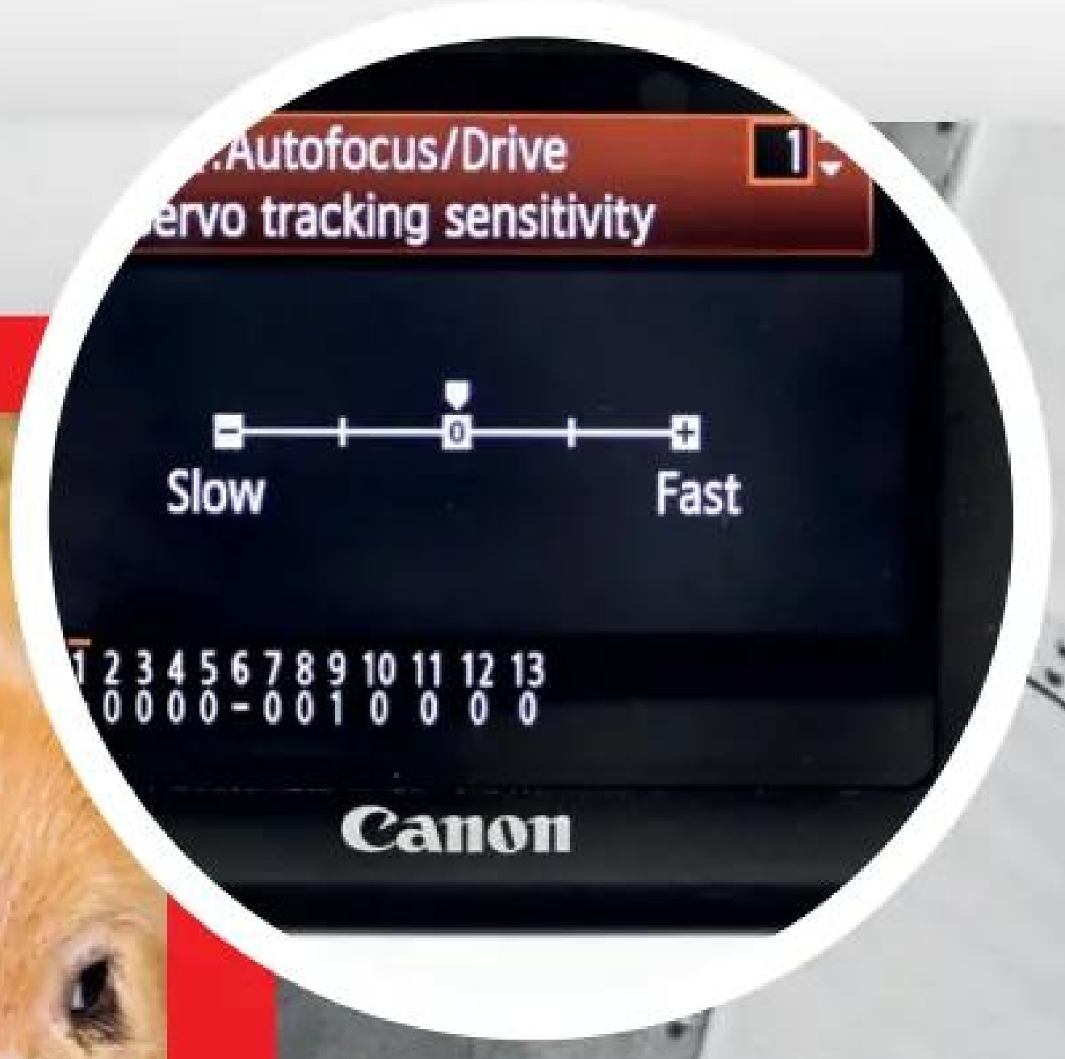
By default your camera will set the exposure meter to make adjustments in a third of a stop. However, if you want to change this to half stops you can do so in the Custom menu. This makes it quicker to move the exposure needle up and down the scale. However, you can get more accurate results by keeping it on the third stop setting.



C.Fn III:Autofocus/Drive 5
Mirror lockup
0:Disable
1:Enable
C.Fn III: 12345678 00001050

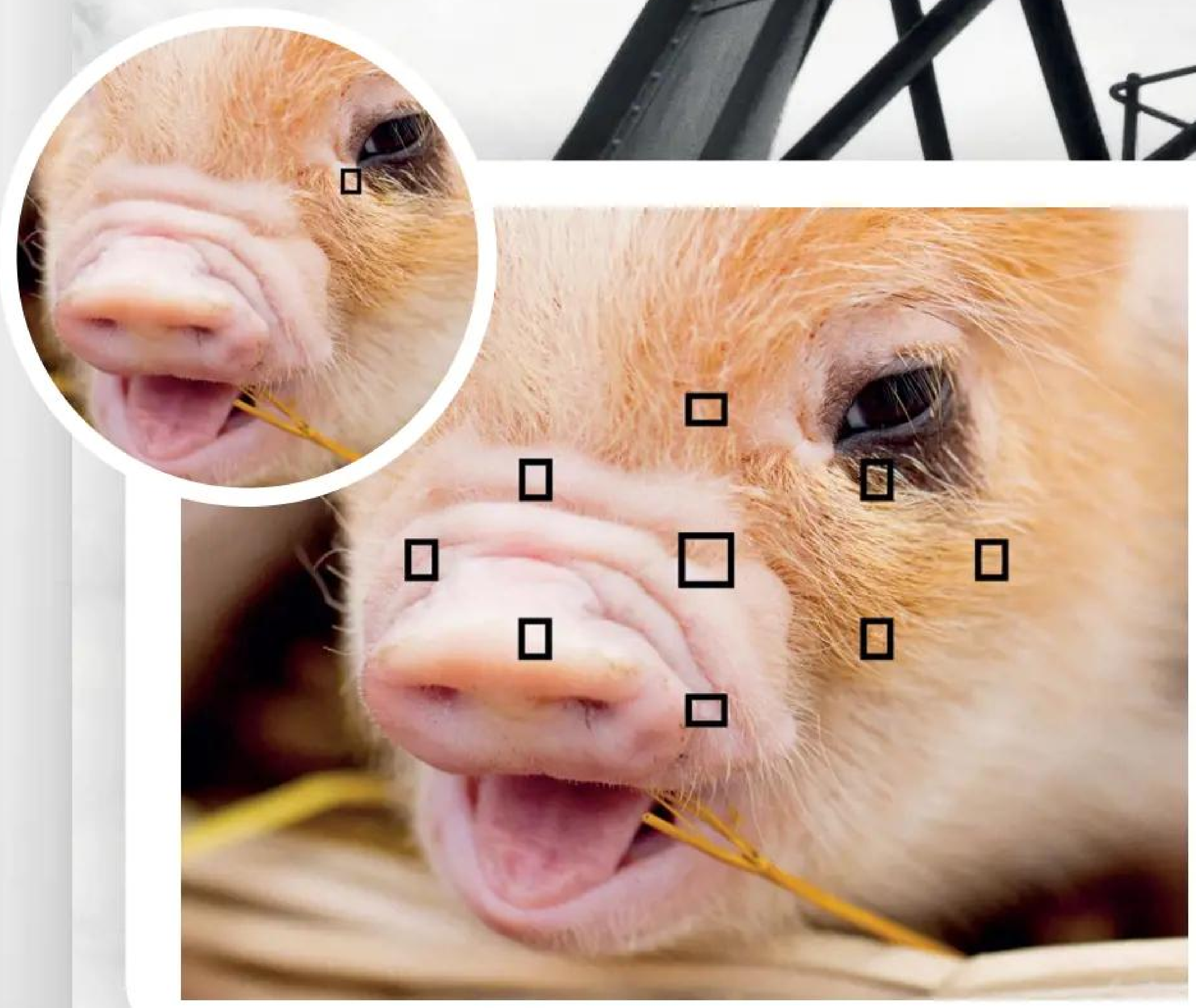
Mirror lock up

Mirror lock up comes in handy when shooting with a long shutter speed. Change the setting to Enable to engage. The feature works by flipping the mirror up in the camera with one click of the shutter, then you press the shutter again to take the photo. It's used to avoid any movement in the camera ruining the shot, so it's best to use it with a remote shutter release, meaning you don't need to touch the camera at all to take the photo.


Autofocus/Drive
ervo tracking sensitivity
Slow
Fast
1 2 3 4 5 6 7 8 9 10 11 12 13
0 0 0 0 - 0 0 1 0 0 0 0
Canon

AI Servo sensitivity

In some of the enthusiast and advanced Canon DSLR models you can change how sensitive the AI Servo tracking feature is. AI Servo should be used when photographing moving subjects, because it gives you the best chance of keeping your subjects sharp. Turn it up to fast to make it more sensitive or back down to slow to make it less.



Display AF points

If you own a more advanced model then you can define whether you want to see all the AF points or just the one selected through the viewfinder. You'll find this option in the custom menu section under the Autofocus/ Drive setting. To see the full AF grid, change Display all AF points to Enable or back to Disable to show just one point.

More functions

Five more camera-customisation tips to improve your Canon DSLR

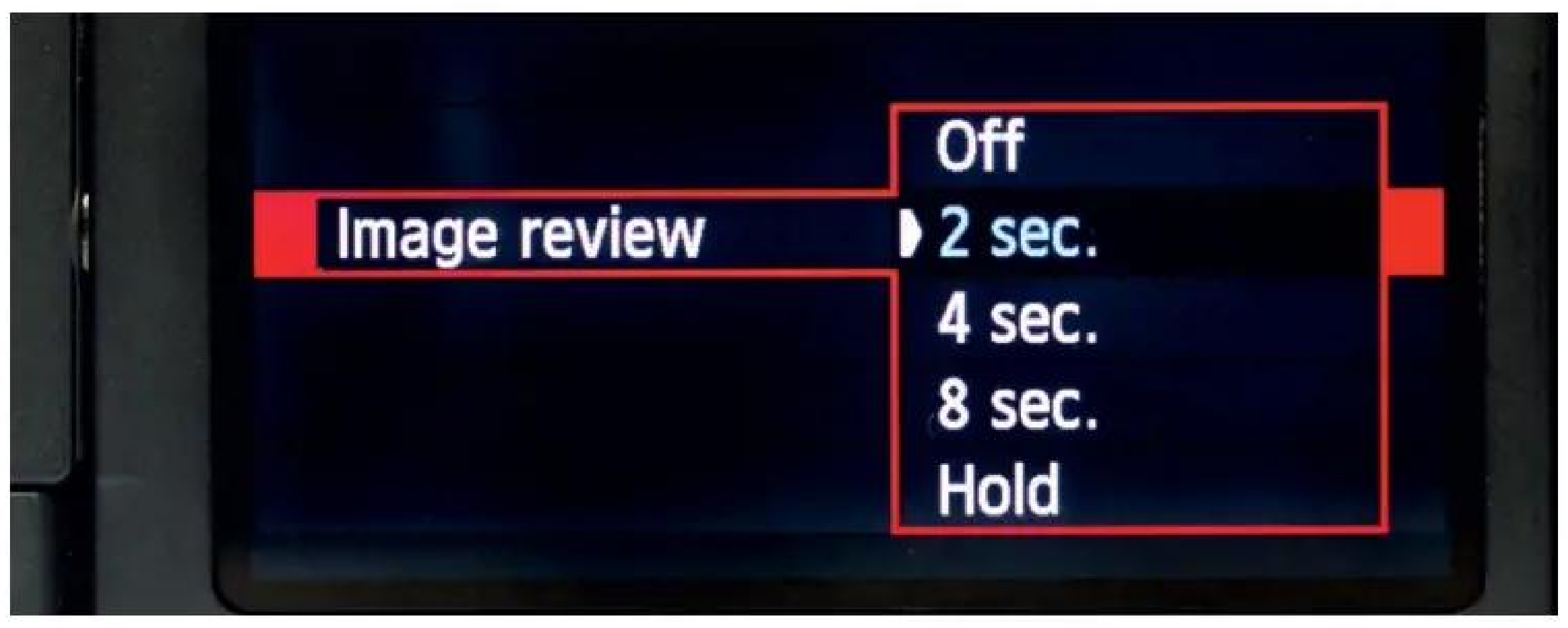
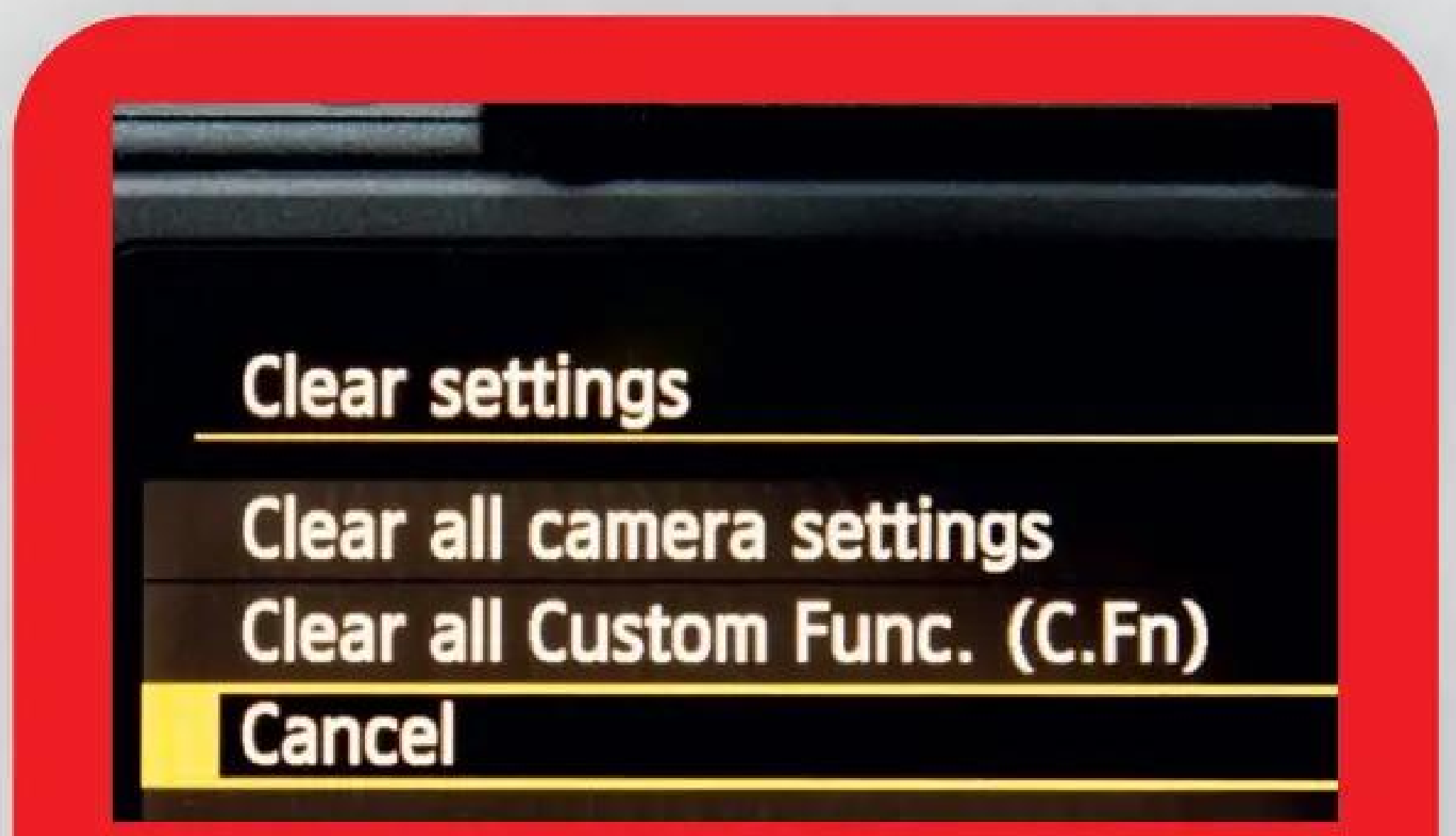


Image review
Off
2 sec.
4 sec.
8 sec.
Hold

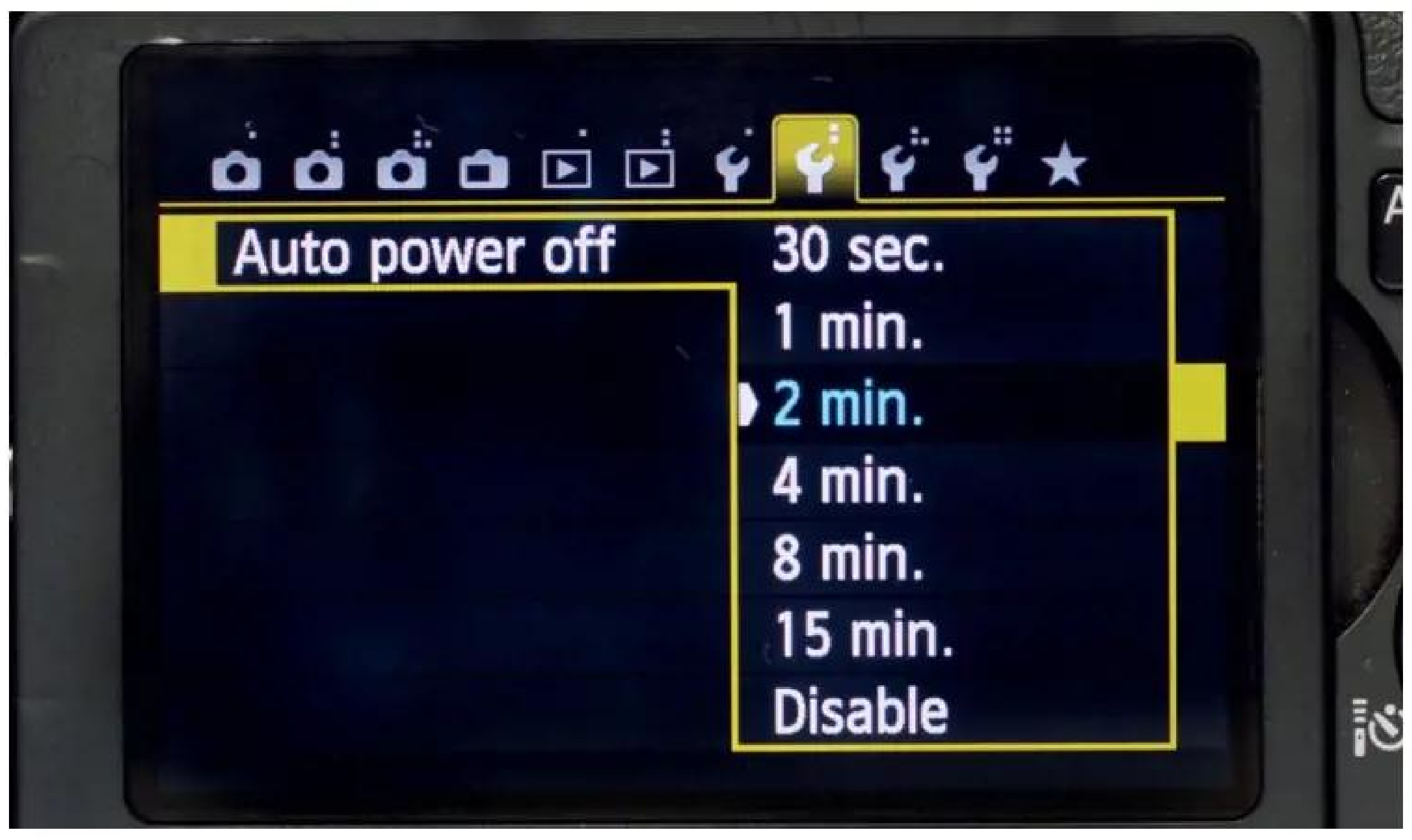
Image review

When shooting it can be useful to glance at your LCD screen every now and then to check if what you're capturing is what you're after. You can alter how long the image stays on the screen in the Image Review part of the main menu. The Image Review setting can be found in the red part of the camera menu, but on some Canon models it will be labelled Review time. You can select whether to have this setting off, at 2 seconds, 4 seconds, 8 seconds, or to hold the image on the screen until you start shooting again or until you select another function on the camera.


Clear settings
Clear all camera settings
Clear all Custom Func. (C.Fn)
Cancel

Clear settings

If you've altered some settings, and you don't like the new setup, then you can reset the camera back to the factory default settings. To do this, head into the yellow setup section of the main menu and find the Clear Settings option. A handy tool at times!


Auto power off
30 sec.
1 min.
2 min.
4 min.
8 min.
15 min.
Disable

Auto power off

You can alter how quickly your camera will power down automatically when not in use. There are a few options to choose from here, and they usually range from 30 seconds to 15 minutes. If you change the setting to the Disable option, be aware that it will drain the battery much faster. To wake your camera up after it's powered down, simply half press the shutter button.

SLR College

Master your EOS in 12 easy-to-follow lessons!

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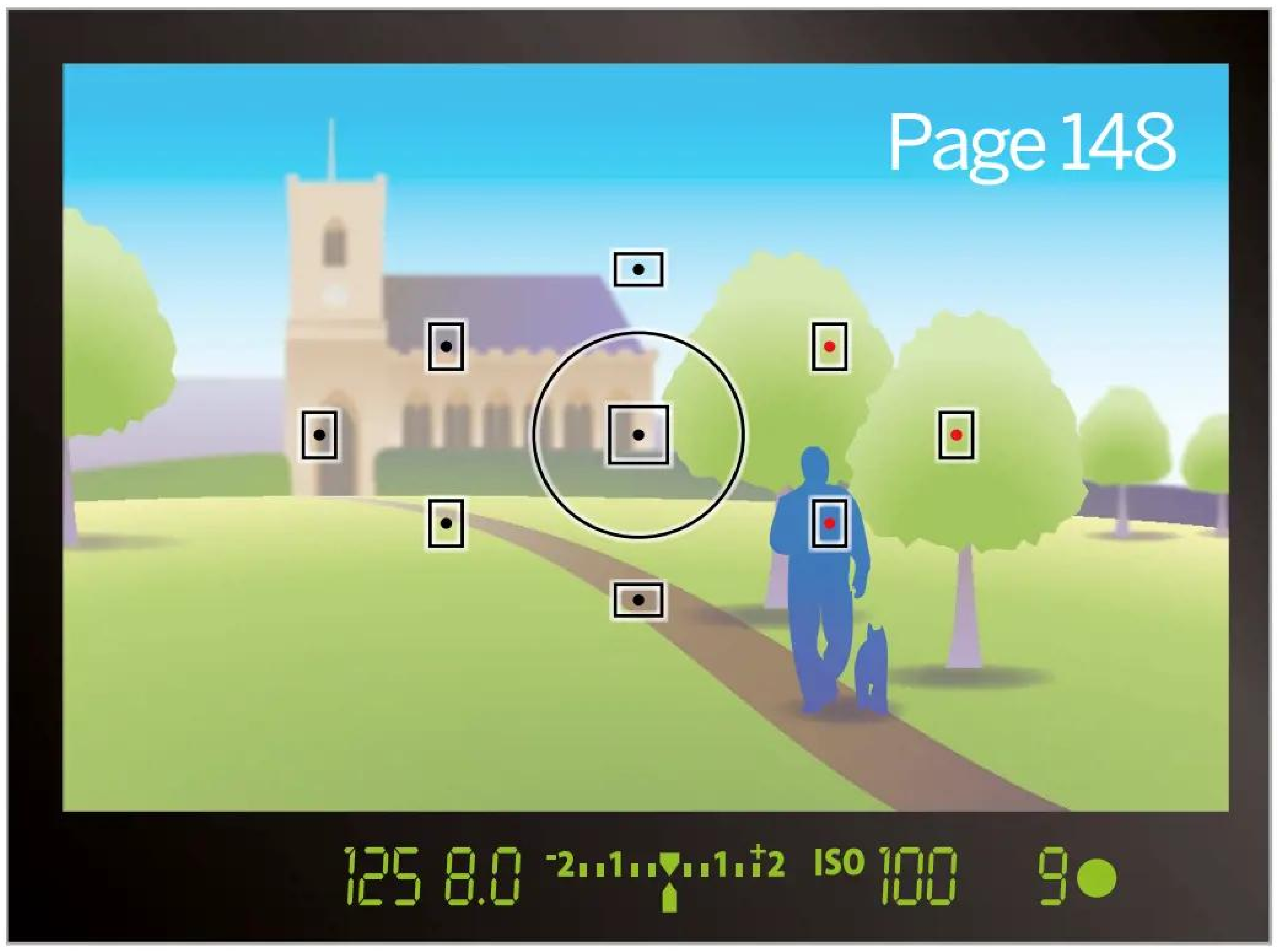


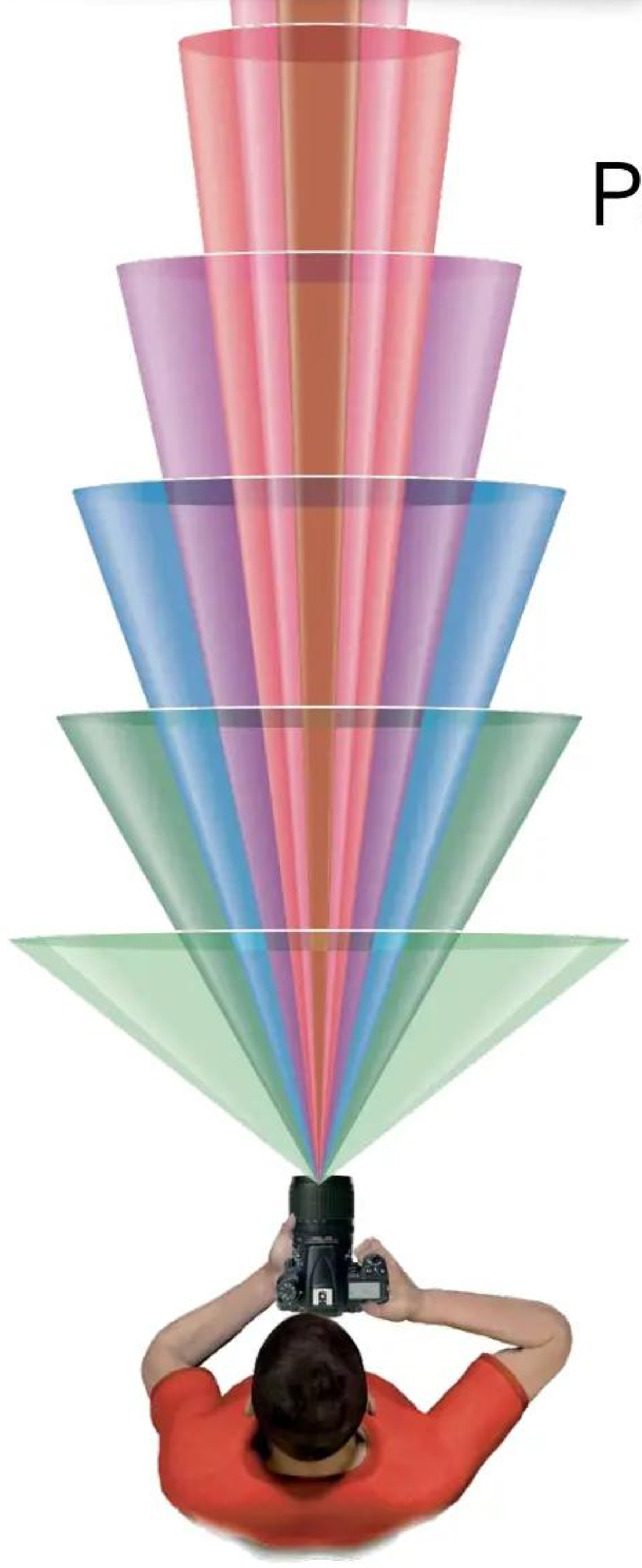
Page 148

125 8.0 -2..1..▼..1..+2 ISO 100 9●

1
2
3
4
AVIVA
GOLLEY
BIRMINGHAM

Page 178

Focal length 144
Focusing 148
Depth of field 154
Aperture 158
Shutter speeds 162
Exposure modes 166
Metering modes 170
White balance 174
Digital processing 178
Flash 182
ISO speeds 186
File formats and memory cards 190



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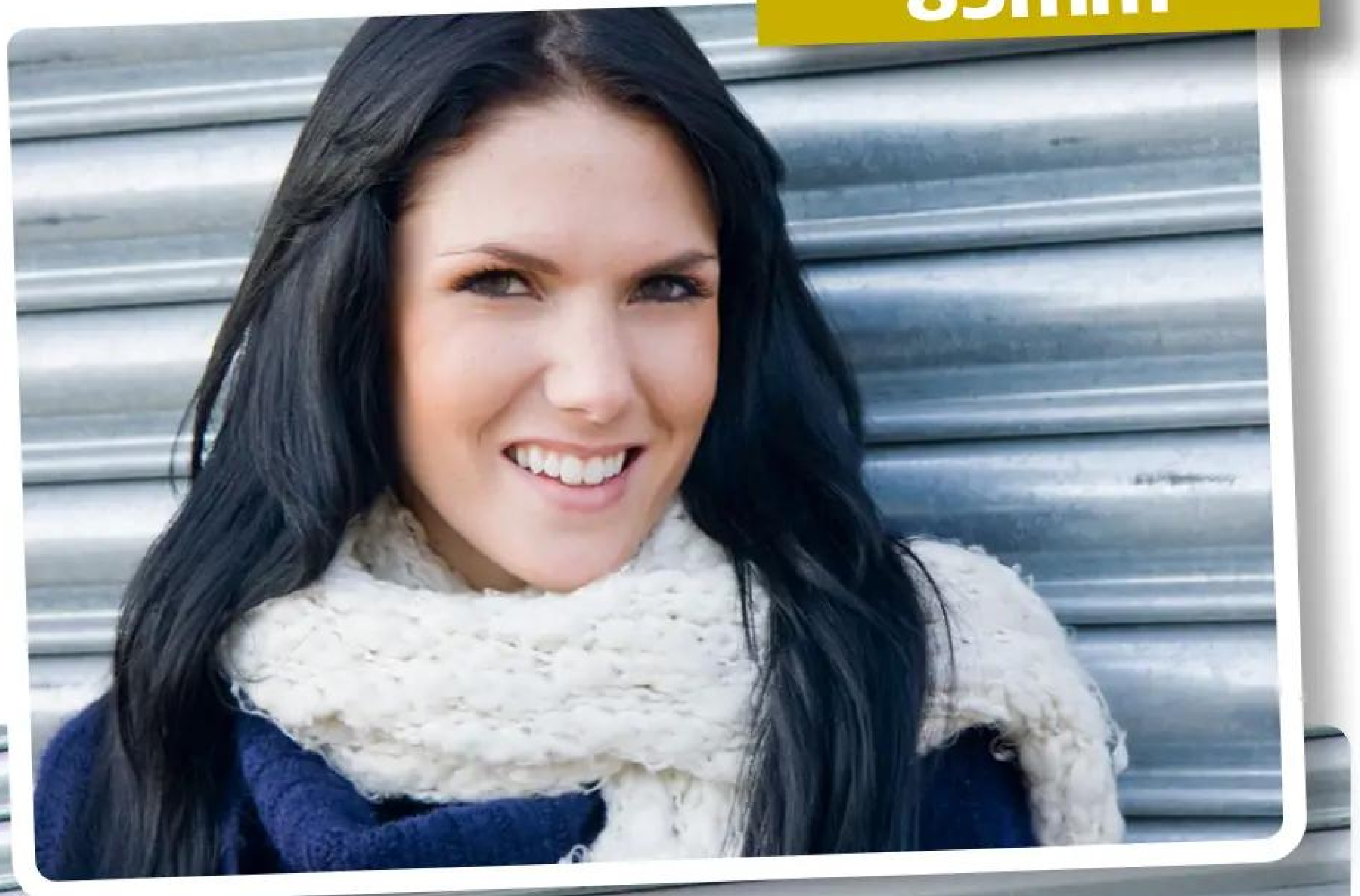
55
35
28
20
17
ULTRASONIC
EF-S 17-55mm
IMAGE STABILIZER
AF
MF
STABILIZER
ON

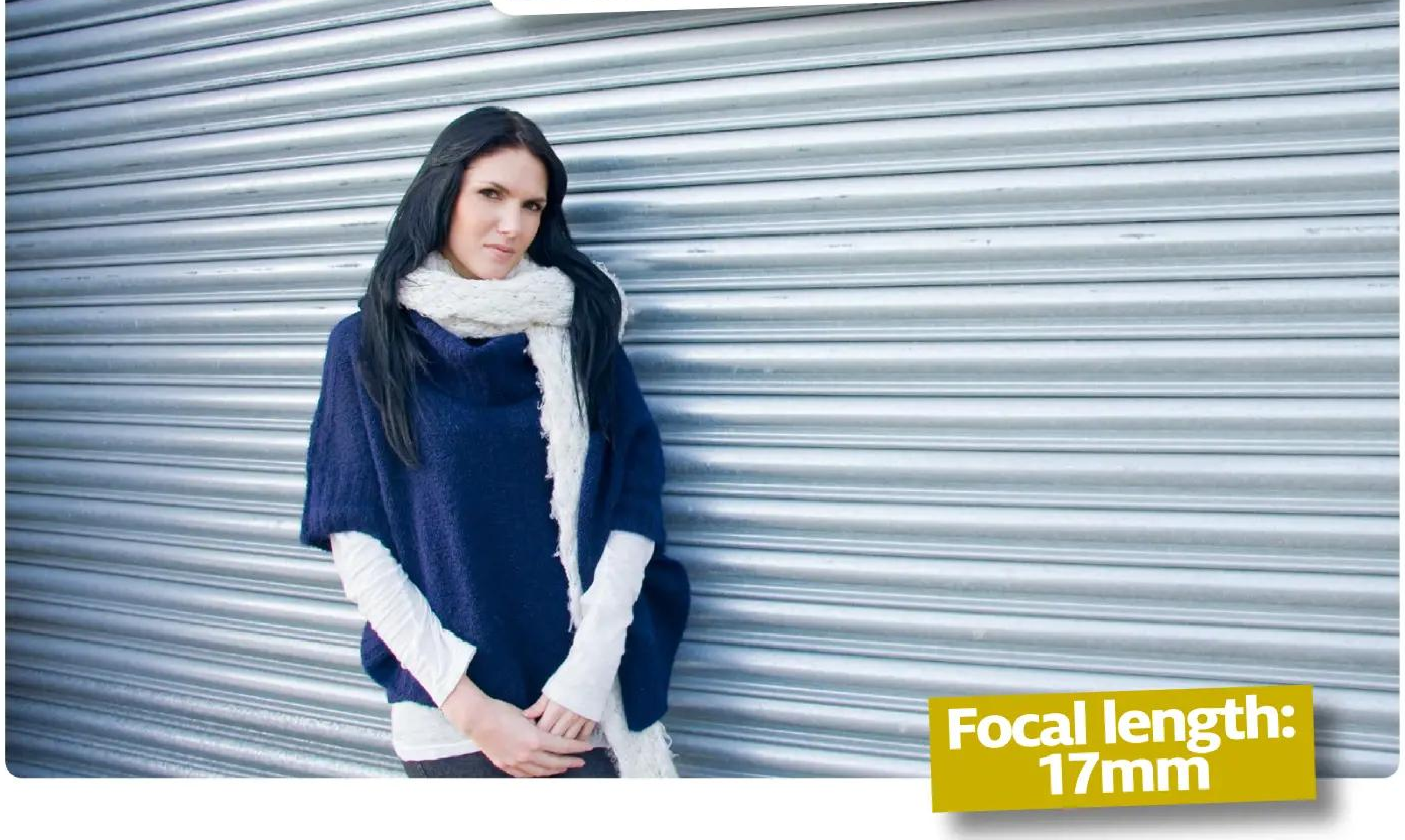
LESSON 1

What is focal length all about?

Welcome to the Canon SLR College – a complete 13-part series that, over the following pages, builds into a comprehensive beginners' guide to how your digital SLR works, and how to get the most from it. In our first lesson we're going to explain everything you need to know about focal length. A major benefit of using a DSLR is that you can choose from a variety of lenses suited to particular photographic situations, and the main determining factor in picking a certain lens is its focal length. Focal length is measured in millimetres, with 35-50mm roughly equalling your field of vision. Lenses with focal lengths of less than 35mm are known as wide-angle lenses and enable you to fit more into your scene, so are good for landscape shots. Lenses with larger focal lengths, around 70mm and upwards, are telephoto lenses and will magnify your subjects, and are good for close-up portraits, sports and wildlife photography. ▶



Focal length: 85mm



Focal length: 17mm

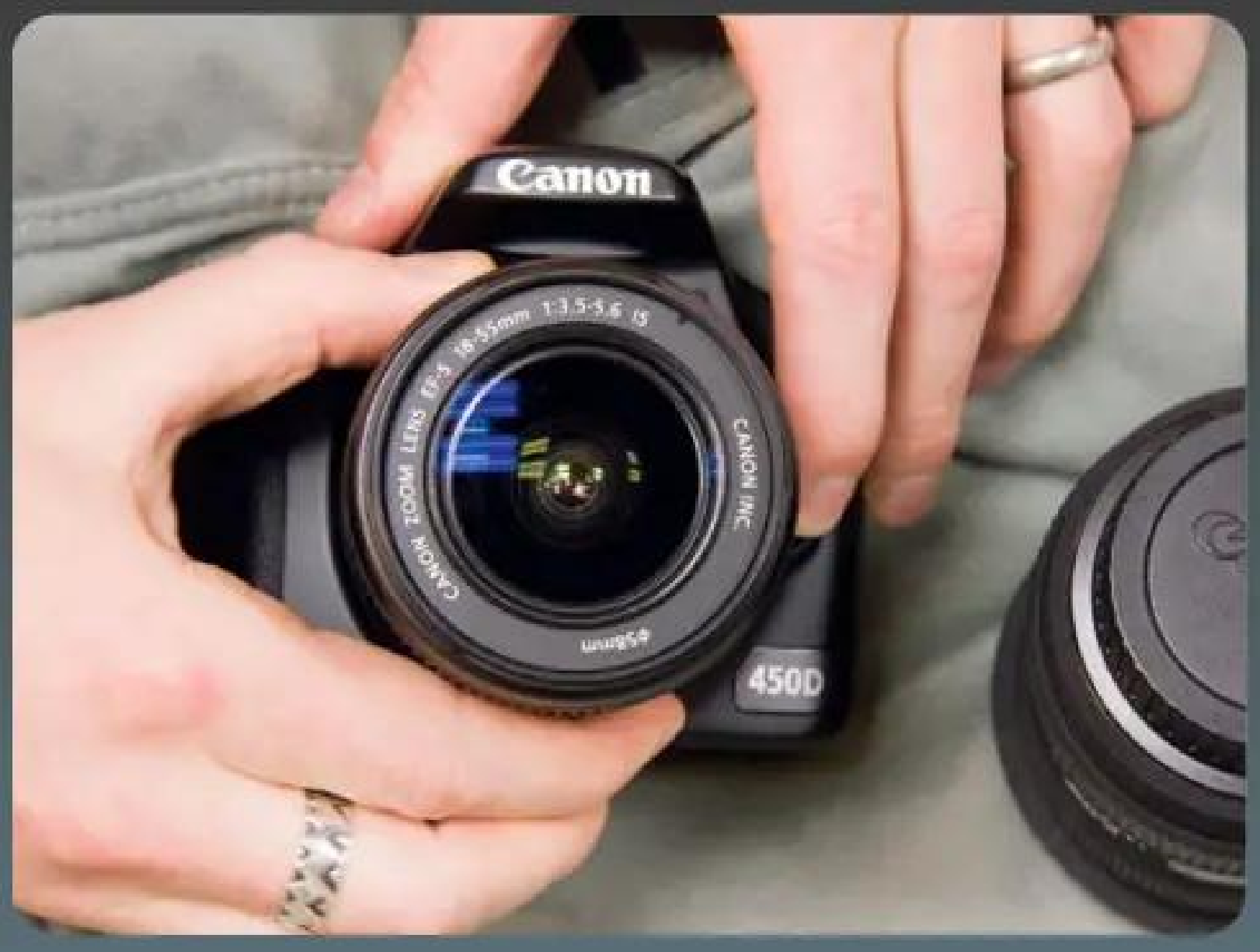
Peter Travers

STEP BY STEP How to switch lenses

1 Don't do this in a dusty atmosphere. Ideally, switch lenses indoors or sheltered from the wind to avoid dust or dirt reaching your camera's sensor.

2 Lay your camera on its back on a soft surface, such as a jacket or kit bag, to protect your rear LCD, and so you'll have both hands free to switch lenses.

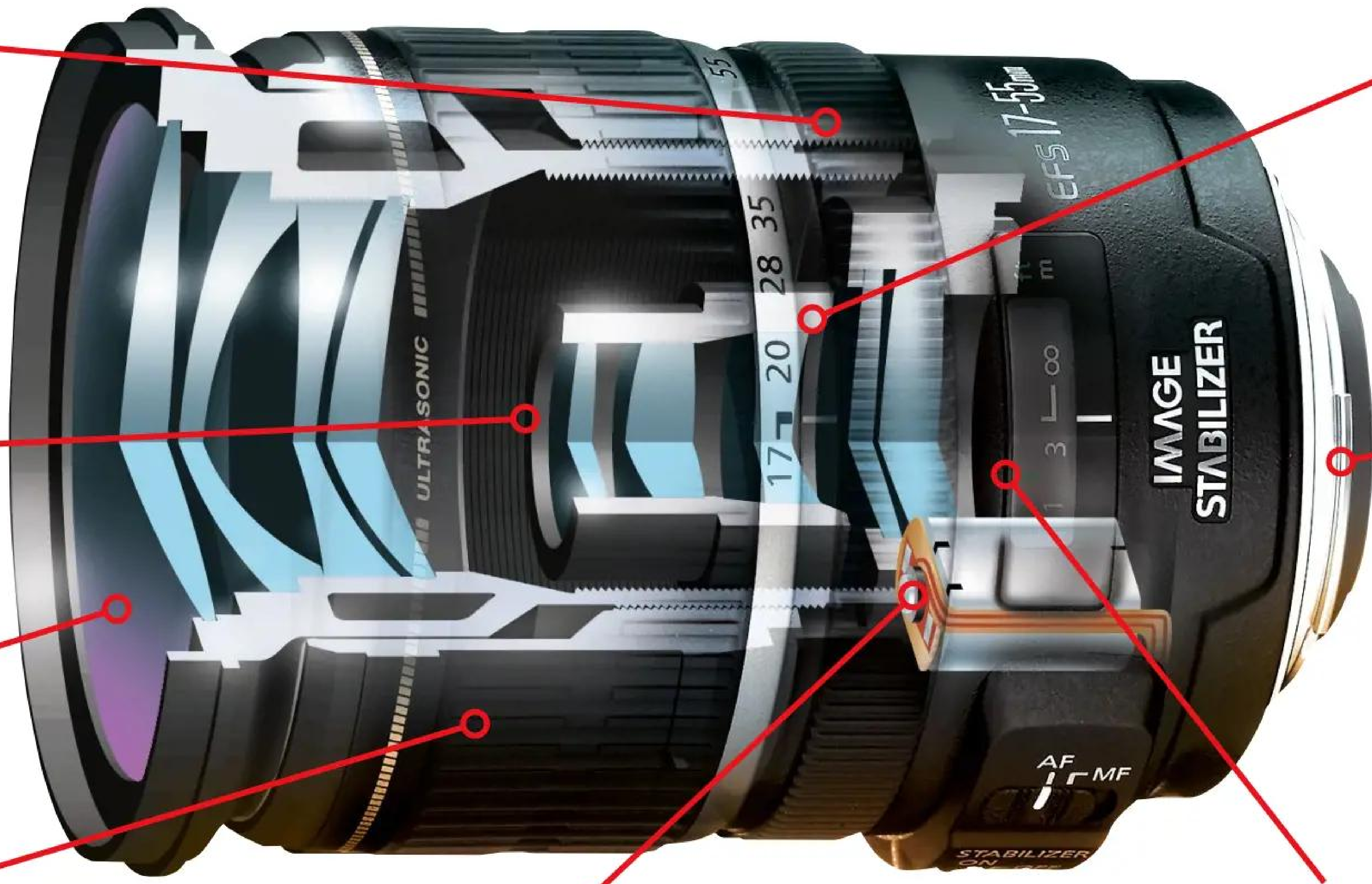
3 Have your new lens within reach to minimise the amount of time your DSLR's innards are open to the elements to stop dust getting in.



4 Use your left hand to press down on the Lens Release Button, use your right hand to turn your lens in an anti-clockwise direction and pull clear.

The anatomy of a Canon lens

The lens is the eye of your camera. We dissect one to show you what's inside



Focus ring
Turn to manually adjust the focus – used when your lens is switched to MF (Manual Focus). The internal elements move together to focus the lens.

Lens aperture
The lens aperture (or opening) controls how much light is let in.

Front element
The widest of all the lens elements, and the one that is easiest to scratch!

Focal length
The focal length you're currently using is indicated by the number on the zoom ring that lines up with the central mark.

Bayonet lens mount
Attaches the lens to your DSLR. Contacts supply power from your camera to drive the autofocus and IS, and allows the camera and lens to communicate.

Zoom ring
By turning the zoom ring, the internal groups of lens elements move to change the focal length.

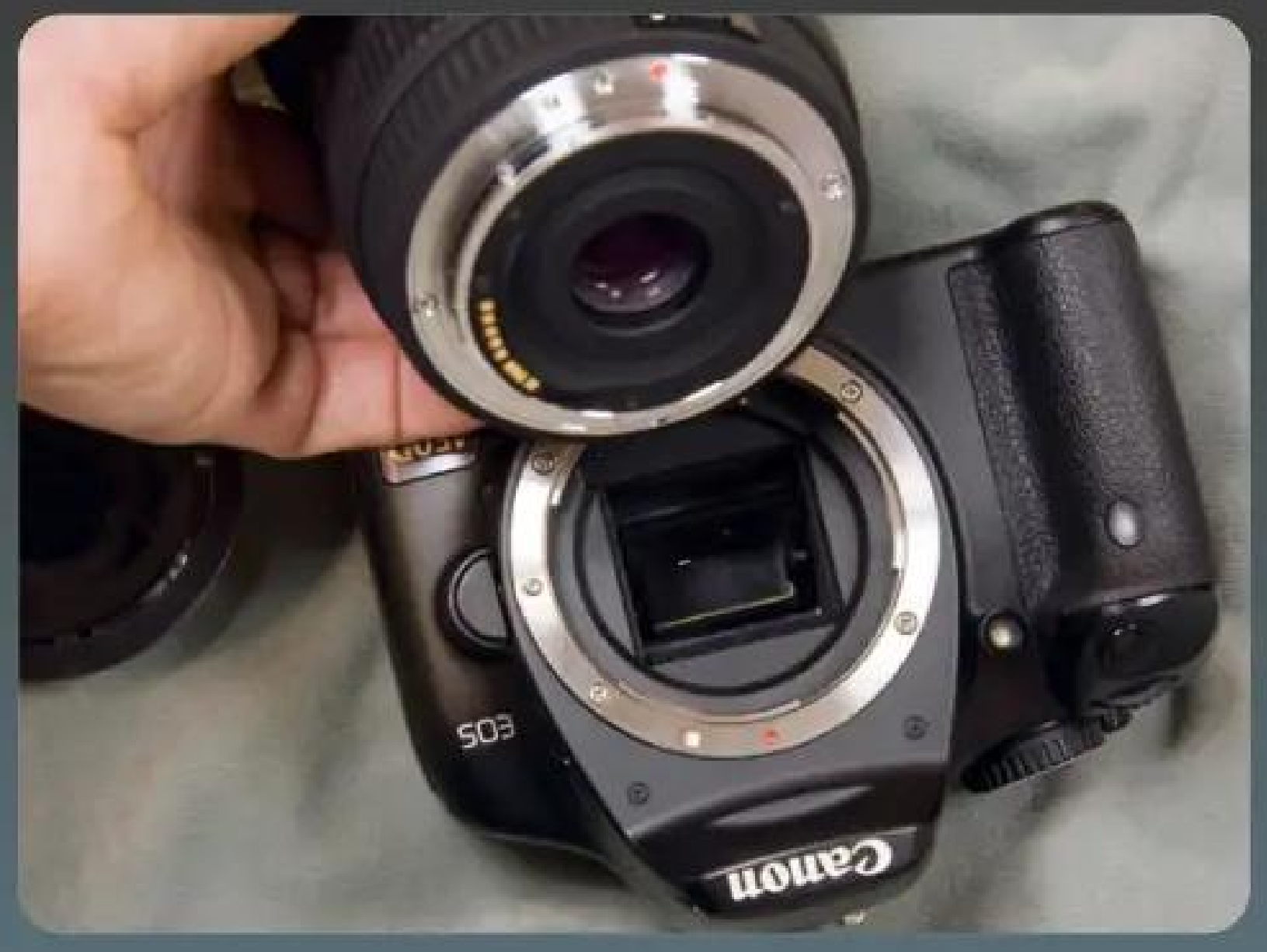
Lens motor
All Canon EOS lenses have built-in motors to move the elements so the autofocus system can focus the image. Some lenses have an Ultrasonic Motor (USM), which is designed to be quieter and faster.

Image Stabilizer (IS)
Canon's Image Stabilizer (IS) technology uses gyroscopic sensors and a micro-computer to detect and correct slight lens vibrations caused by hand shake.

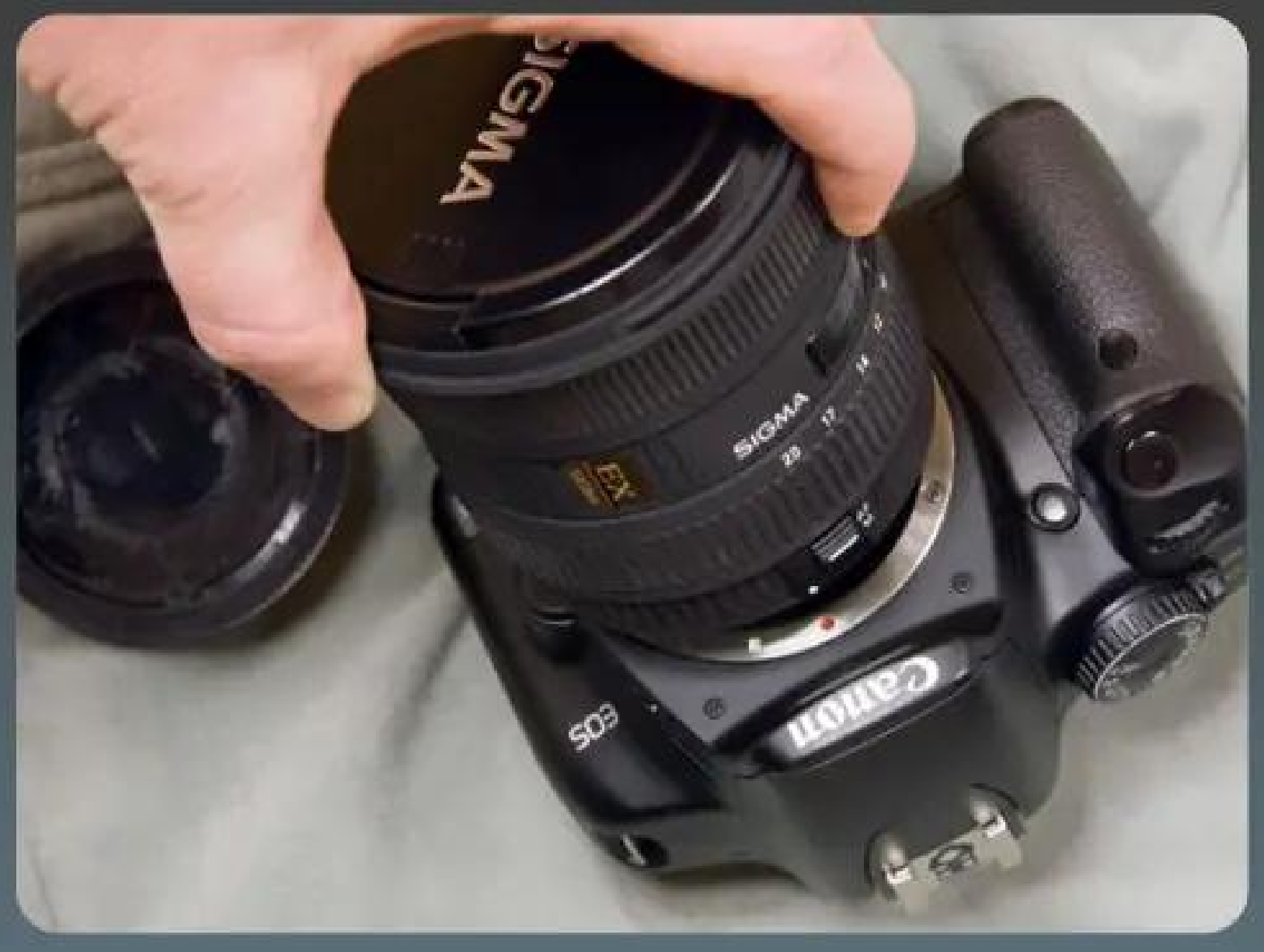
Illustration: Andy McLaughlin

Do I need to buy Canon EF or EF-S lenses?

With the vast choice of Canon lenses available, you may well get confused when it comes to upgrading lenses. Should you buy EF or EF-S lenses? Well, unless you're a pro photographer, own a full-frame (or APS-H) DSLR (5D or 1Ds or 1D ranges), or have deep pockets, you don't have to invest in EF Canon lenses. Instead, concentrate on Canon's EF-S lenses as they're designed for smaller-sensor EOS DSLRs like the 700D and 70D, are often more affordable, and you'll still capture top results.



5 Put the lens down to one side. Remove the dust cap from the lens mount of the replacement lens and put it on the lens you've just removed.



6 For Canon EF and third-party lenses, line up the red dots on the lens and camera. For EF-S lenses, line up the white squares on the lens and camera.

7 Slot the lens in, turn it clockwise until your hear it click. Take the lens cap off your replacement lens and you're ready to take some pictures!

Jargon Buster

Focal length
Measured in millimetres, the focal length is the distance from the lens's optical centre to your EOS camera's sensor.

Angle of view
What you actually see through the viewfinder. The longer the focal length (eg 300mm), the smaller the angle of view. Conversely, the shorter the focal length (eg 18mm), the greater the angle of view.

Zoom lens
A lens that has a range of focal lengths – eg 18-55mm. A zoom lens doesn't mean it's a telephoto lens!

Prime lens
A lens that is not a zoom, with just a single focal length.

Crop factor
The value used to convert the actual focal length of a lens into the effective focal length. Most Canon DSLRs have a 1.6x crop factor.

When we talk about the focal length of lenses, what we're really talking about is the 'angle of view' you can see through your Canon DSLR's viewfinder. In simple terms, the longer your focal length (such as a telephoto lens at a focal length of 200mm), the smaller your angle of view and larger your subject appears in the frame. The shorter your focal length (such as a wide-angle lens with a focal length of 18mm), the greater your angle of view.

Focal length and crop factor

This angle of view can be reduced further, depending on the Canon DSLR you use. The smaller the sensor, the narrower the angle of view the lens provides (as the smaller sensor sees a smaller section of the view seen by the lens). This phenomenon is known as the 'crop factor'. With popular EOS models, such as the Rebel, 400D, 450D, 1200D, 70D and 7D, there is a crop factor of 1.6x; this effectively magnifies focal length by 1.6. With telephoto focal lengths, this has the advantage of bringing you even closer to the action – a 200mm lens has an effective focal length (EFL) of 320mm (200x1.6) – which is helpful for wildlife or sports photography. Conversely, crop factor is seen as a disadvantage on wide-angle focal lengths, as it increases an 18mm lens to an EFL of 29mm (18x1.6), reducing how much you can fit in your frame – not so good when shooting indoors where space is limited.

Lenses with a fixed focal length are known as prime lenses – such as the Canon EF 50mm f/1.8 lens, whereas lenses offering a range of focal lengths are known as zooms; an EF-S 55-250mm zoom offers all the focal lengths from 55mm to 250mm inclusive. Some people confuse 'telephoto' with 'zoom', yet you can have a zoom lens that isn't telephoto, for example the Canon EF-S 10-22mm f/3.5-4.5 is an ultra-wide-angle zoom.The Canon EF-S 18-55mm f/3.5-5.6 standard zoom lens is also known as a 'kit lens', as it's often supplied with popular EOS DSLRs. The 18-55mm refers to the focal length range; 18mm is the wide-angle end, while the 55mm end is a mid-range focal length. The f/3.5-f/5.6 refers to the maximum aperture range; at 18mm it will be at its widest aperture of f/3.5, while at 55mm it will be reduced to f/5.6. However, narrower apertures are available at all its focal lengths.Higher spec lenses, such as the EF-S 17-55mm f/2.8 IS USM lens, have constant wide apertures throughout their focal length range, in this case f/2.8 at every focal length from 17 to 55mm.

YOUR ASSIGNMENT! Focal length course work

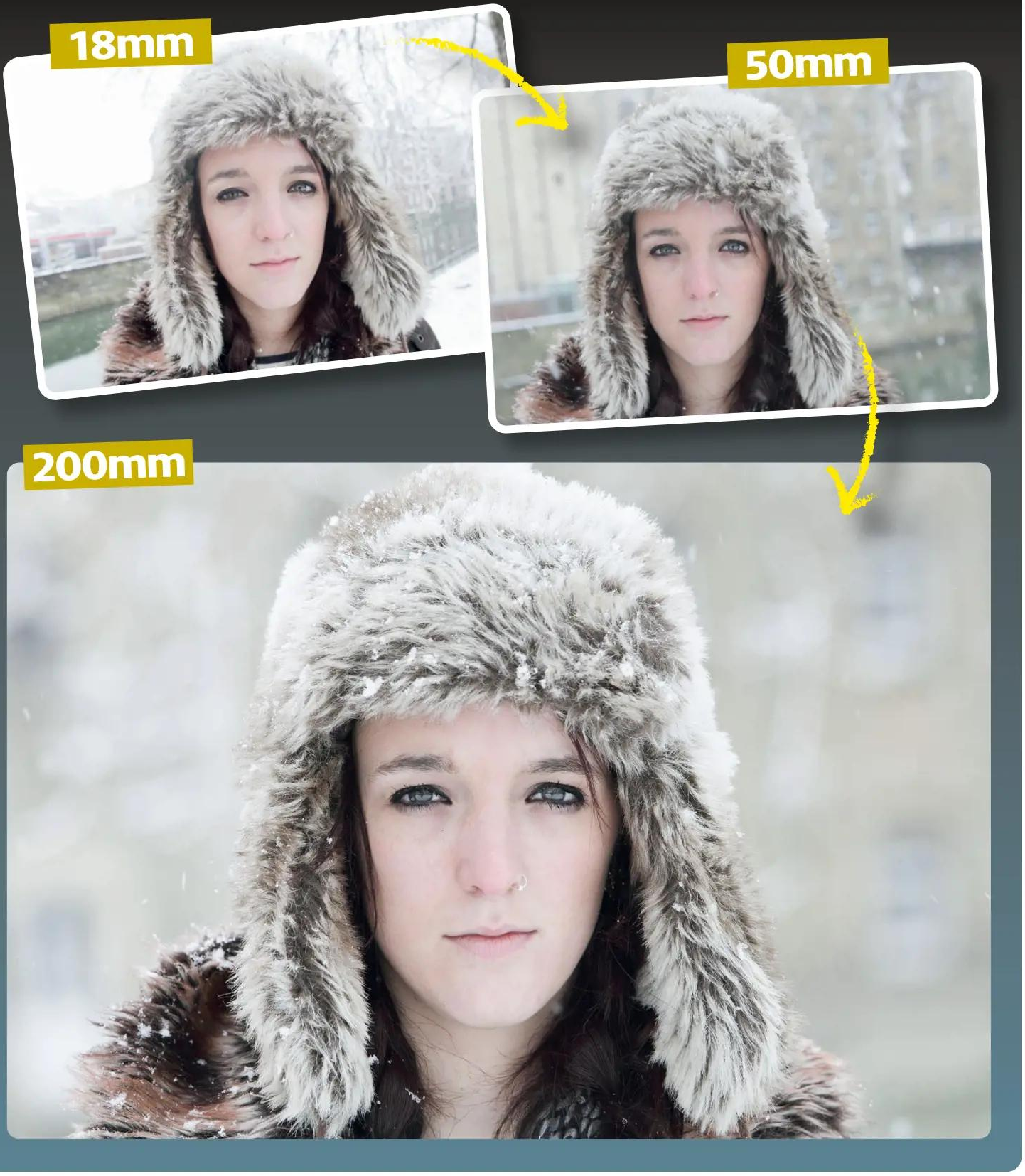
As part of our Canon SLR College, we'll be setting you a practical assignment at the end of each chapter to help you practise your newly learnt skills. To recap, when you change your focal length you're changing the angle of view. So, at a short focal length of 18mm you can fit more of your subject in your frame compared to using a long focal length of 200mm from the same spot.

But focal length is much more than a simple cropping tool, and has other creative effects on your picture. Zooming also has an indirect effect on perspective – as telephotos are used from further away from a subject than telephotos. Wide-angles, therefore, make foreground objects look larger, and telephotos tend to compress objects at different distances so that they look closer together. Focal length also affects depth of field, a great creative tool that determines how much of your scene is in sharp focus – we will look at this in detail in lesson 3 (p80).

For your first assignment, see how different focal lengths affect your results:

1 Take three shots of the same subject standing in exactly the same position at three focal lengths: 18mm (wide-angle), 50mm (standard) and 200mm (telephoto).

2 Take three shots of the same subject at different focal lengths – 18mm, 70mm and 200mm – this time moving so the subject fills the frame each time (see example, right).



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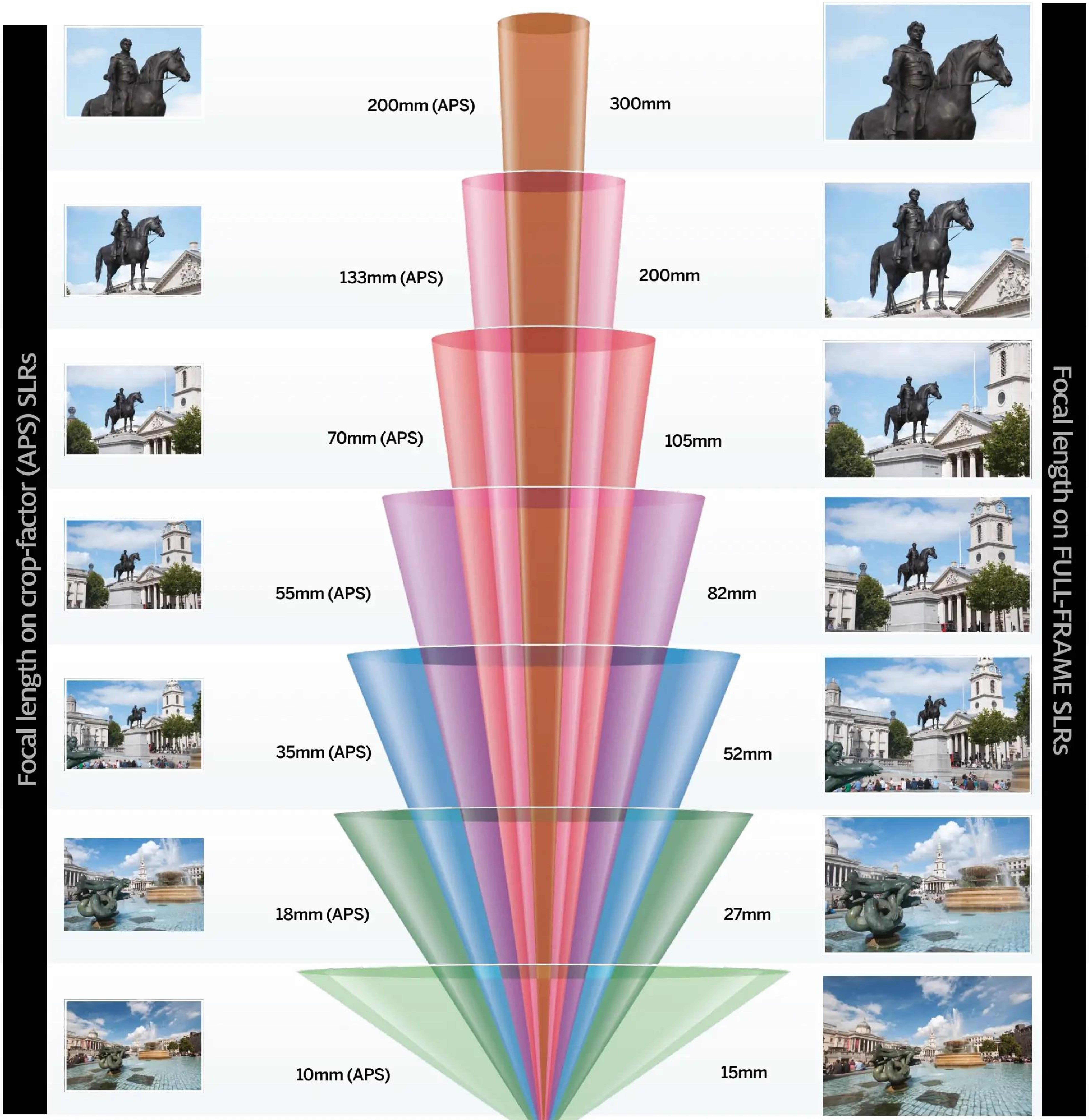

Focal length on crop-factor (APS) SLRs
200mm (APS)
300mm
133mm (APS)
200mm
70mm (APS)
105mm
55mm (APS)
82mm
35mm (APS)
52mm
18mm (APS)
27mm
10mm (APS)
15mm
Focal length on FULL-FRAME SLRs

FOCAL LENGTH AND ANGLE OF VIEW

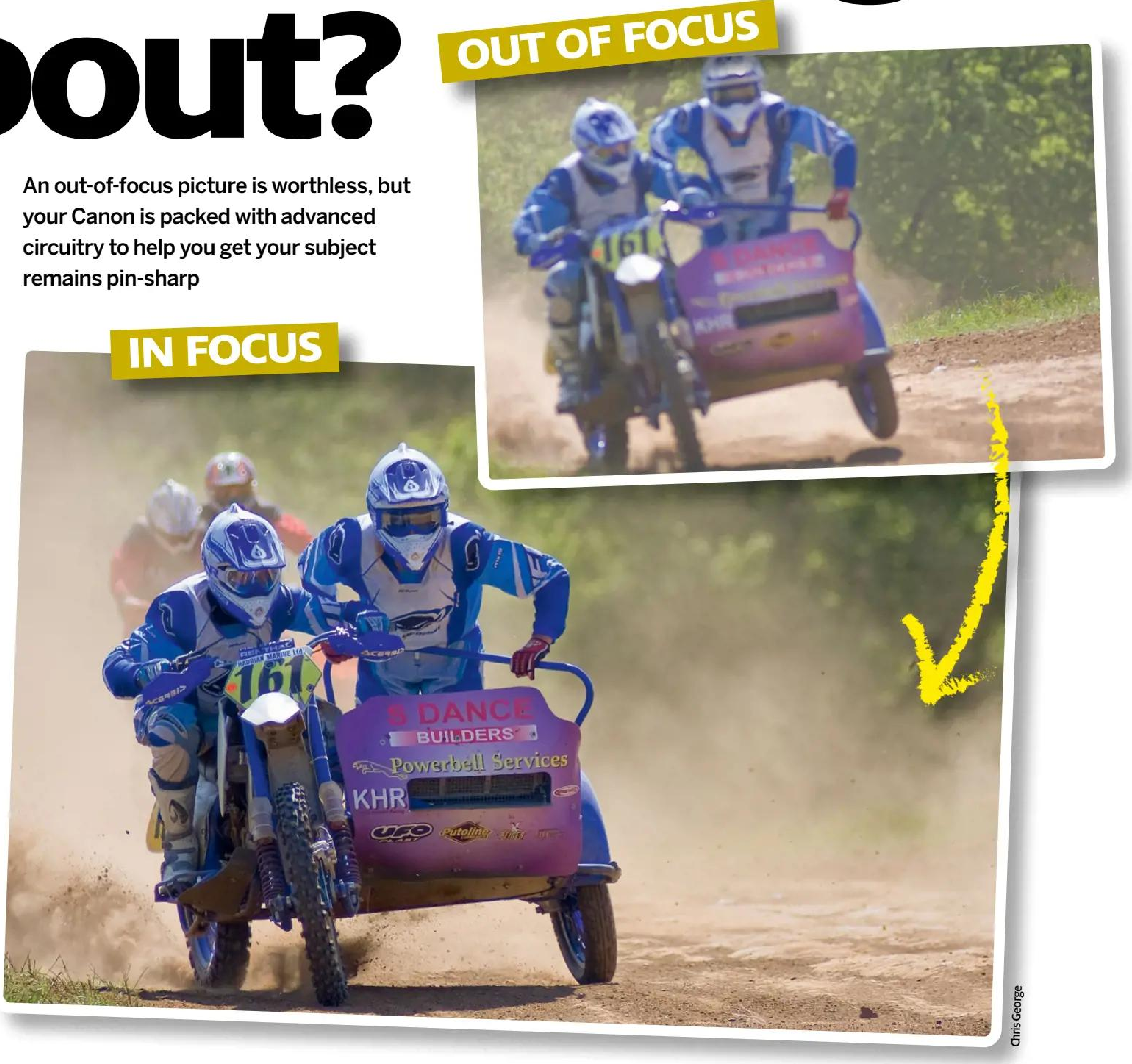
These two factors are closely related, but your camera's sensor size has an effect too – a smaller sensor needs shorter focal lengths

With 35mm film cameras you could get a good idea of a lens's angle of view from its focal length. This still applies with Canon's full-frame cameras. However, its smaller format 'APS' cameras have a smaller sensor. This means you need shorter focal lengths to get the same angle of view

LESSON 2

What's focusing all about?

An out-of-focus picture is worthless, but your Canon is packed with advanced circuitry to help you get your subject remains pin-sharp



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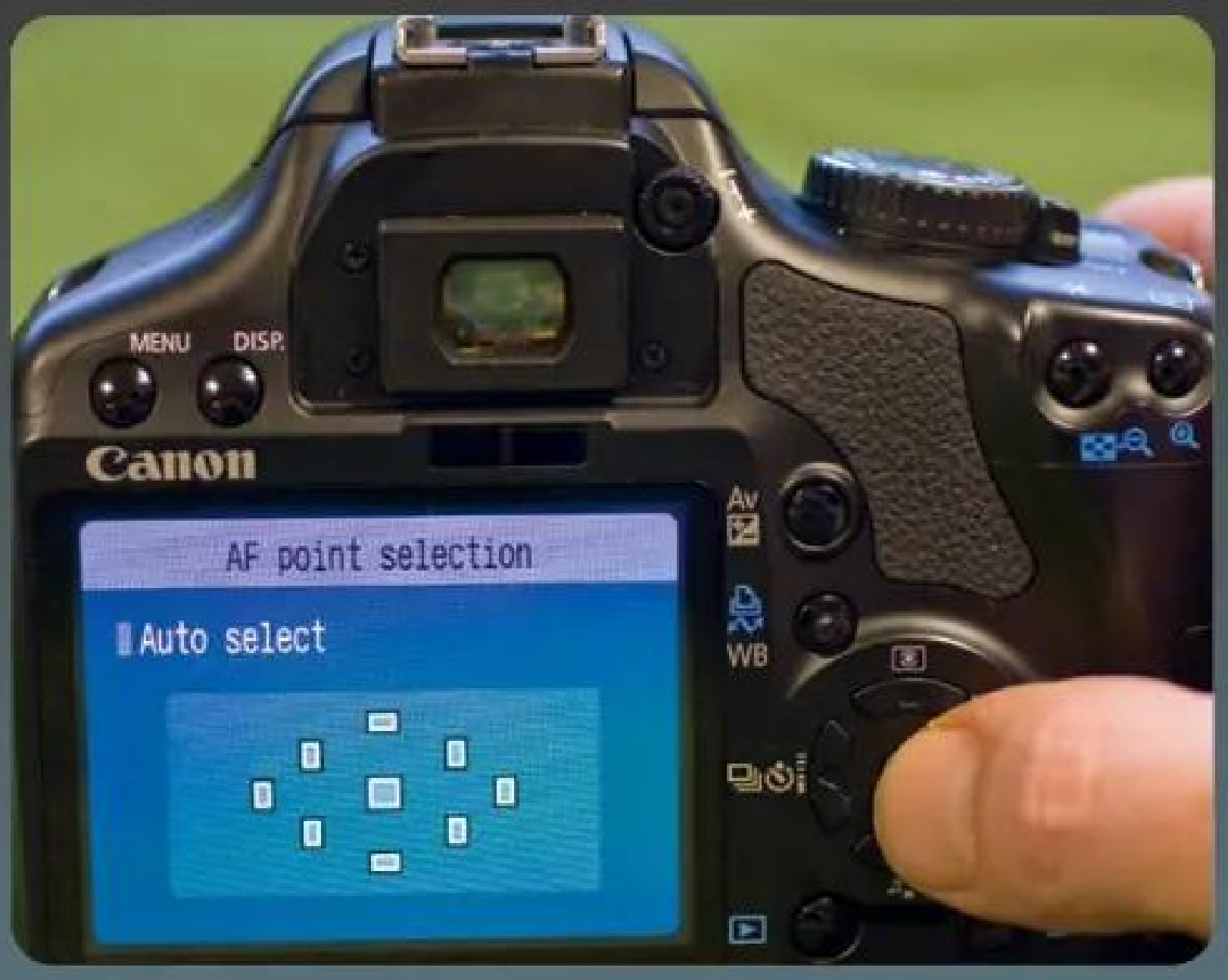
Pictures where the main subject isn't sharp are often completely worthless – and for this reason focusing is one of the most crucial controls on your digital SLR. A lens can only focus precisely at one distance at a time, so it needs to lock onto the correct part of the frame or your subject may appear blurred. Fortunately, thanks to depth of field (a phenomenon that we will look at in greater detail next lesson, beginning on page 164), a range of distances in your image can often actually appear to be in focus. All the same, your EOS provides a range of different systems that allow to get the main part of your image sharp – as well as a number of checks for you to ensure that key areas of the photograph are not out of focus.

Canon introduced autofocus (AF) on its SLRs 27 years ago – and the technology has improved immensely over this time. Essentially, a special sensor in the camera body assesses the contrast in the image, then adjusts elements in the lens to bring the image into focus. Unfortunately, there are a ▶

STEP BY STEP Control autofocus by squeezing gently!

1 Check you are set up for automatic focusing. Autofocus only works if the switch on the lens is set to AF.

2 Press the AF Point Selection button (you can find this at the top-right corner at the back of your EOS).

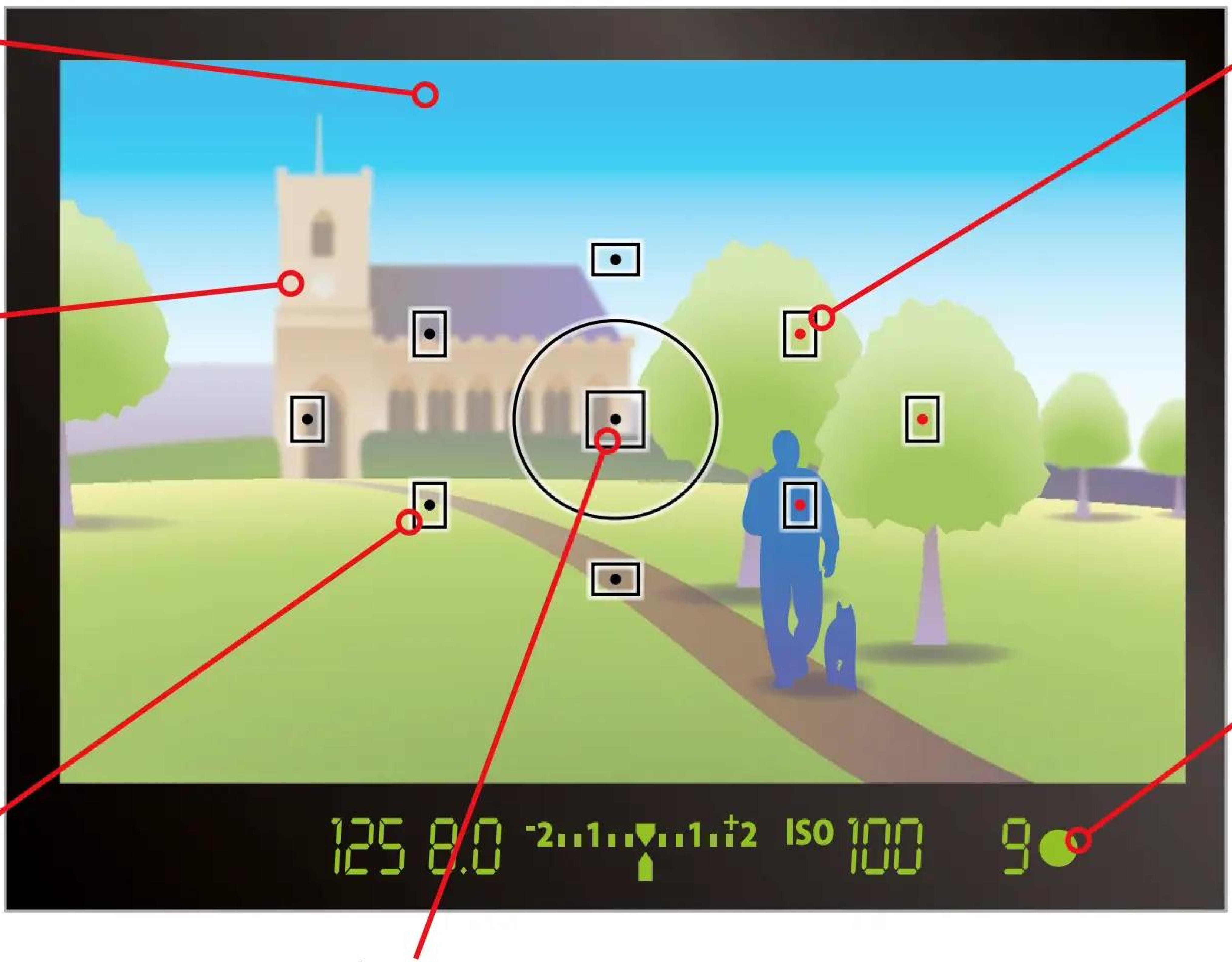


3 Press the Set button (to the right of the rear LCD) until the AF Point Selection mode is set to Auto Select.

4 Always focus before you take your shot! Squeeze the trigger halfway down gently, and the AF comes to life.

Learn how to read the viewfinder

Your DSLR's viewfinder gives lots of information about focusing, if you know where to look



Focusing screen
The image you see in the viewfinder is projected by the lens onto the focusing screen.

Focus preview
The focusing screen has an etched surface, which helps you identify which parts of the image are in sharp focus – and which are not (as with the church here). It also gives a rough guide to how much depth of field you will get if you set the widest available aperture.

Multiple AF points
Current Canon DSLRs offer between 7 and 45 points, where the autofocus point can measure subject distance.

Central AF point
Of all the autofocus points, the one in the centre is the most sensitive. It is therefore the best AF point to use when shooting in low light, or when precise focusing is critical. You can use this central AF point even if you don't want the subject to be in the middle of your photo.

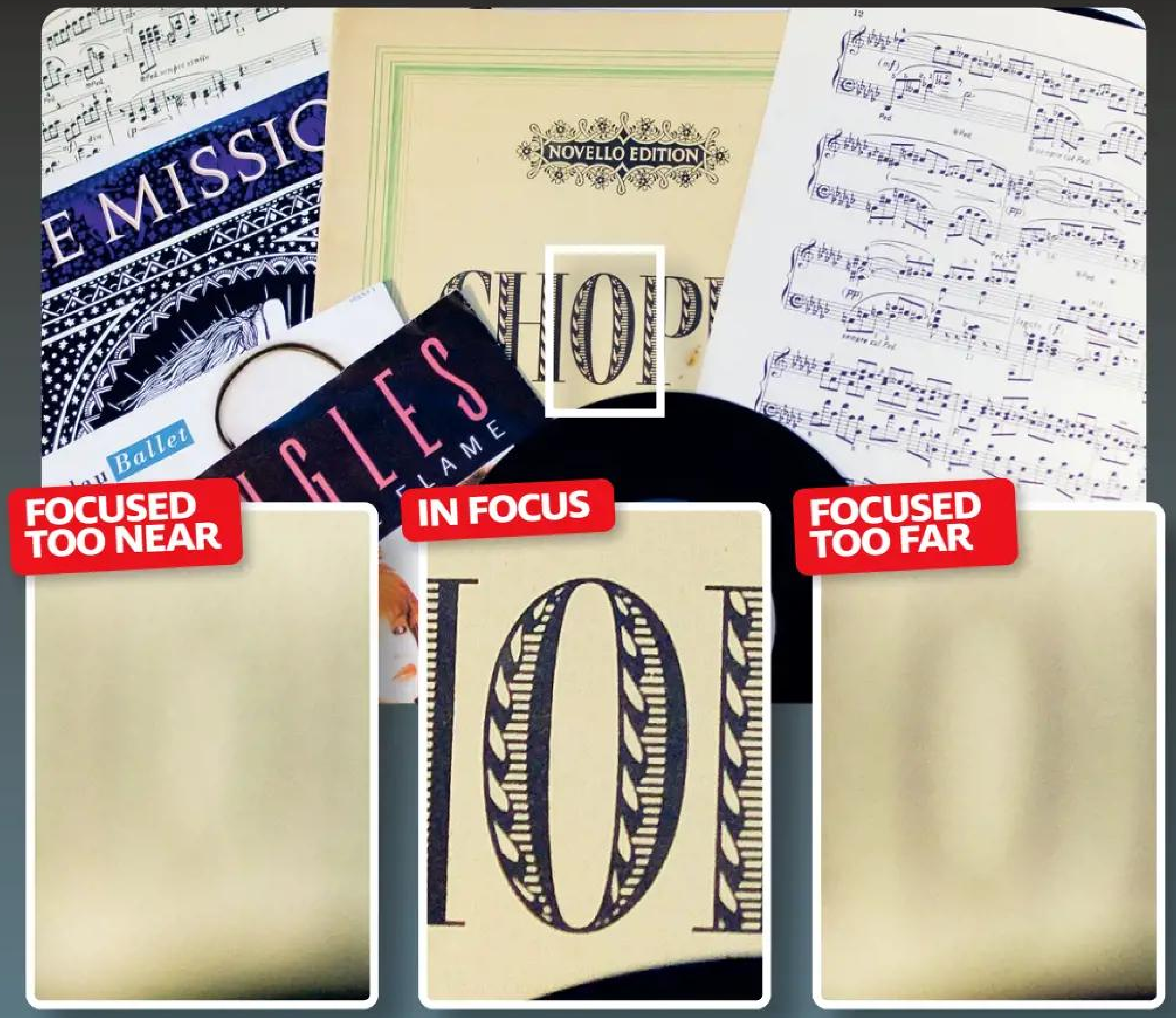
Red alert
The AF points in use will briefly flash red as you squeeze the shutter release. Look out for these, as they confirm that the camera has locked onto the right subject. Here three points flash, showing the person and the two near trees are in focus. Not shown in AI Servo AF mode.

Focus confirmation
A green circular LED will light up when the autofocus has locked onto a subject (when using One-Shot AF mode). It will blink if the AF cannot lock onto the subject, or you are too close. The LED does not light if using AI Servo AF.

Illustration: Andy McLaughlin

How does autofocus really work?

The autofocus system in your Canon SLR works by looking at the image, and then adjusting the lens using a motor. It can tell whether a shot is in focus by using the principle that a sharp image has a higher contrast than an out-of-focus one. So rather than actively measuring the distance between camera and subject, it uses a sensors that measure the image contrast at key points in the picture (a pair of sensors correspond to each AF point you see in the viewfinder). By analysing the signal from each of the AF sensors, this system can adjust the lens to the point at which the highest-contrast image is achieved. If more than one AF point is being used, the system assumes that you want to focus on the point that gives the closest focusing distance.



Low contrast
Lens focused too near, giving a low-contrast image on the sensor

High contrast
Lens focused precisely, giving a high-contrast image on the sensor

Low contrast
Lens focused too far, giving a low-contrast image on the sensor

Jargon Buster

Depth of field

A measure of how much of a picture is in focus, from the nearest point in the scene to the camera that looks sharp, to the furthermost point that looks sharp. The amount of depth of field is dependent on the aperture, the distance that the lens is focused at, and the focal length of the lens.

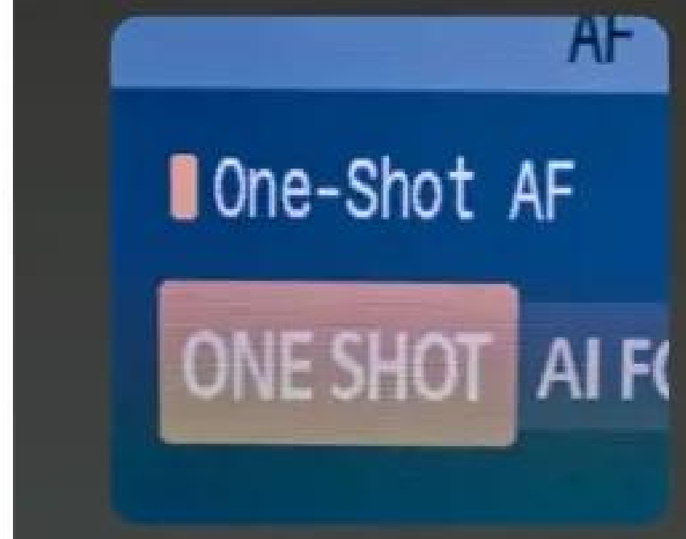
Focusing screen

The surface upon which the viewfinder image of a digital SLR is projected. A textured surface is designed to accentuate the degree by which the image is sharp or not – thereby providing assistance when focusing.

CAMERA SETUP

Choosing your focus mode

Get ready to change settings if the subject starts or stops moving...



ONE SHOT AF

The best mode for stationary subjects. In this mode, the autofocus locks the focus position as soon as it is happy that it has focused on the target. The circular green LED in the viewfinder provides confirmation that the focus has been found, and you can now take a shot.

AI SERVO AF

The best mode to use for moving subjects. Half-press the shutter and the autofocus system continually adjusts to track the subject. Its predictive focus system continues to track the anticipated path of the subject even after the shutter has been fired.

AF
HOT
AI FOCUS
AI S

AI FOCUS AF

Ideal for when you are shooting a mix of static and moving subjects – such as at a wedding. In this mode, the camera automatically switches between One Shot and AI Servo AF – depending on whether it detects any movement in the scene.

AF
MF
STABILIZER

MANUAL

Switching off the autofocus can prove more accurate or faster in some specific situations – such as in low light, with low-contrast targets, or when shooting some fast-moving subjects that follow a predictable path. The red and green LEDs still light up in the viewfinder.

Chris George

number of reasons why the system is still not foolproof.

First, your camera cannot know which part of the frame you want to focus on. A number of sensors are used to detect the subject, but the AF system will assume that you want to focus on the part of the picture that is closest to the camera (and this is obviously not always the case). You can get around this by manually selecting an AF point that lines up with the subject – or by moving the camera so that an AF point focuses on your subject, then using Focus Lock and recomposing your shot.

Moving targets

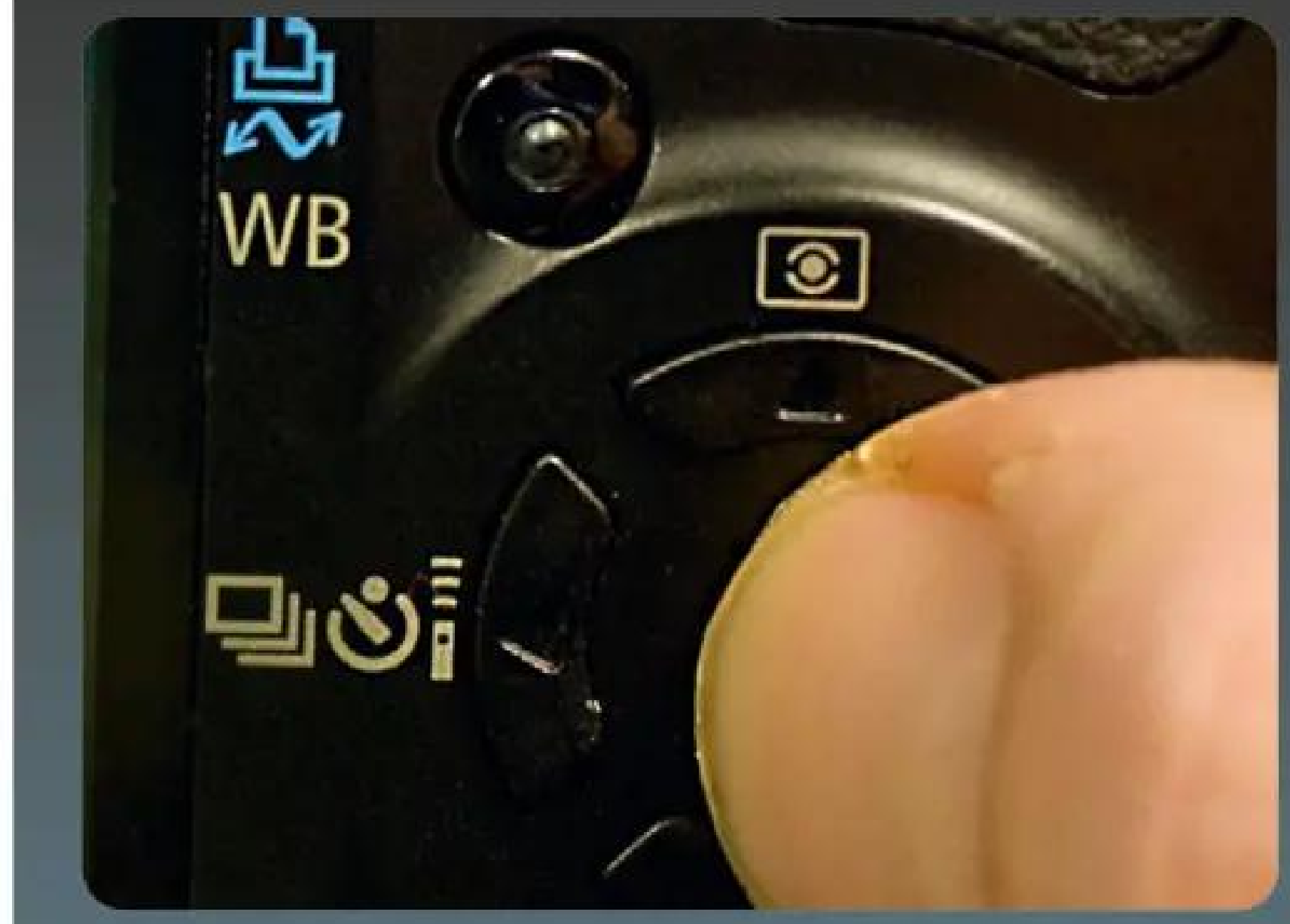
Accurate focusing is also complicated by the fact that not all subjects are stationary. In the default autofocus mode (One Shot AF), the lens locks the focus when it has found the subject distance. But with moving subjects, you want the to switch to a mode (AI Servo AF) that tracks the subject, right up to the point the shutter opens.

The autofocus system is a passive affair, which essentially looks at the viewfinder image and adjusts the lens accordingly, until the image it sees is as high-contrast as it can make it. With uniform, low-contrast subjects (such as a plain white wall, or open sky) it can find no contrast to focus on, and can 'hunt' vainly for a target to lock onto. To aid autofocus, therefore, it can often pays to find a part of the scene with sufficient contrast to measure the focus from.

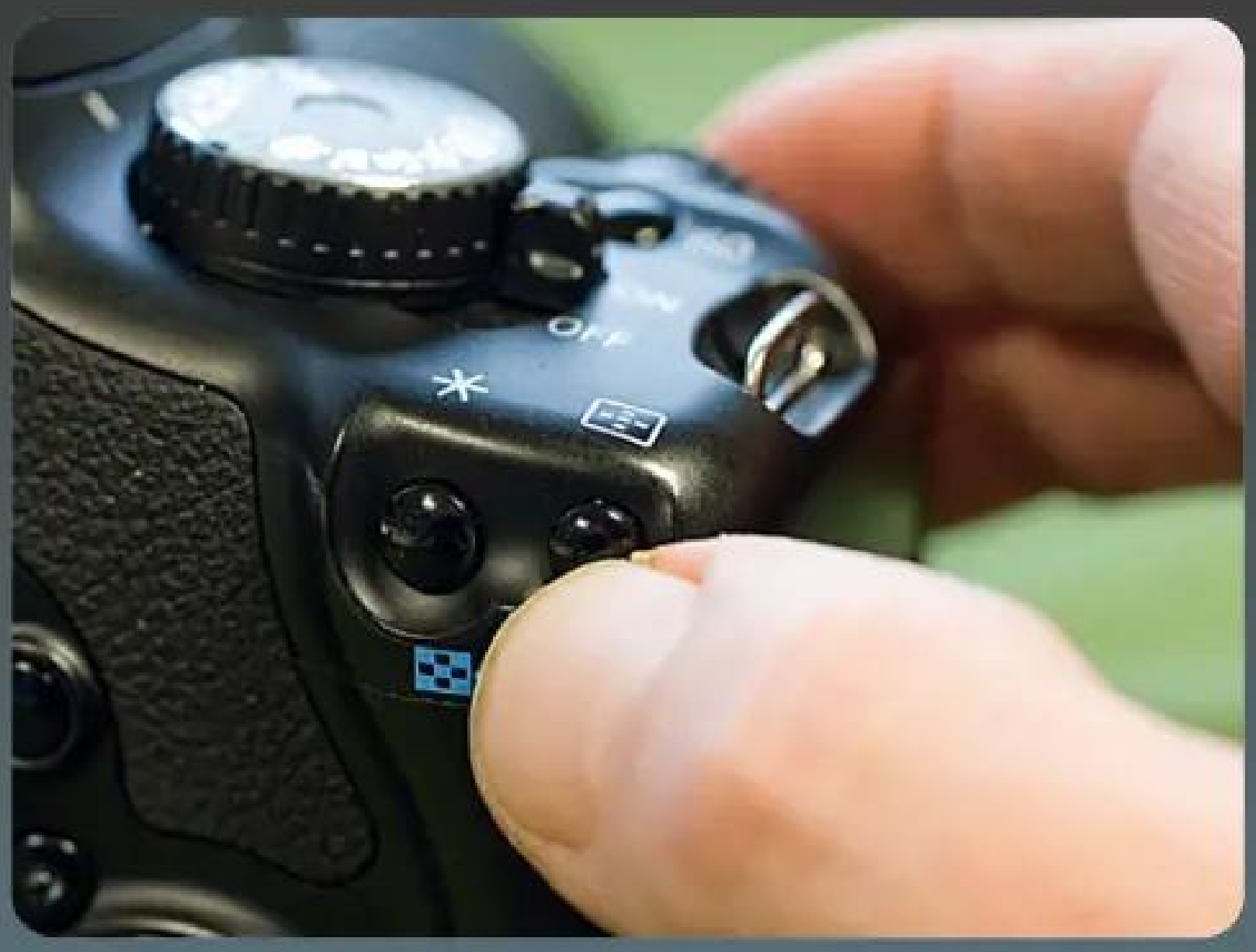
Good light is also essential for operation – and this is not just dependent on the brightness of the scene. Lenses with wider maximum ▶

STEP BY STEP

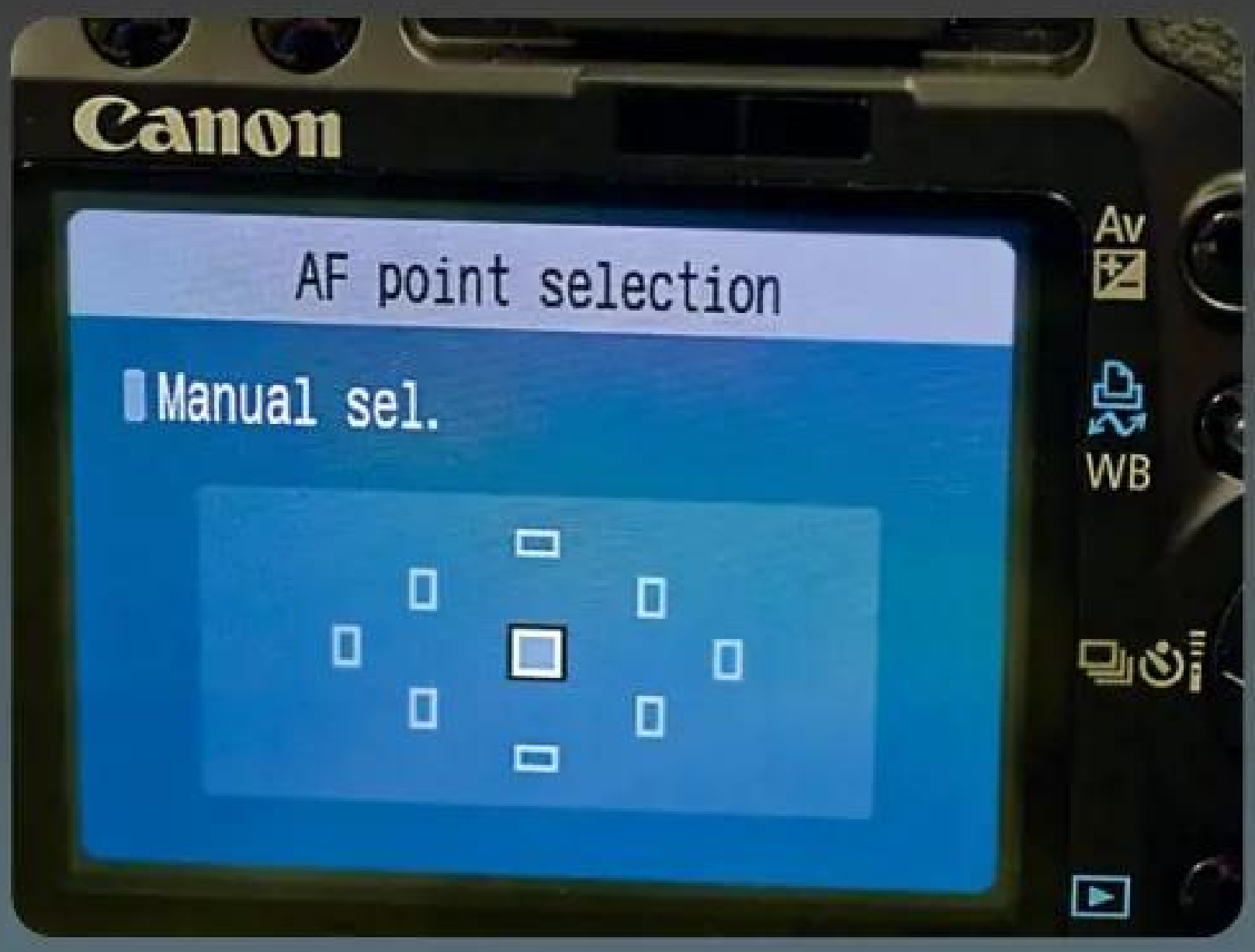
Use Focus Lock for off-centre subjects



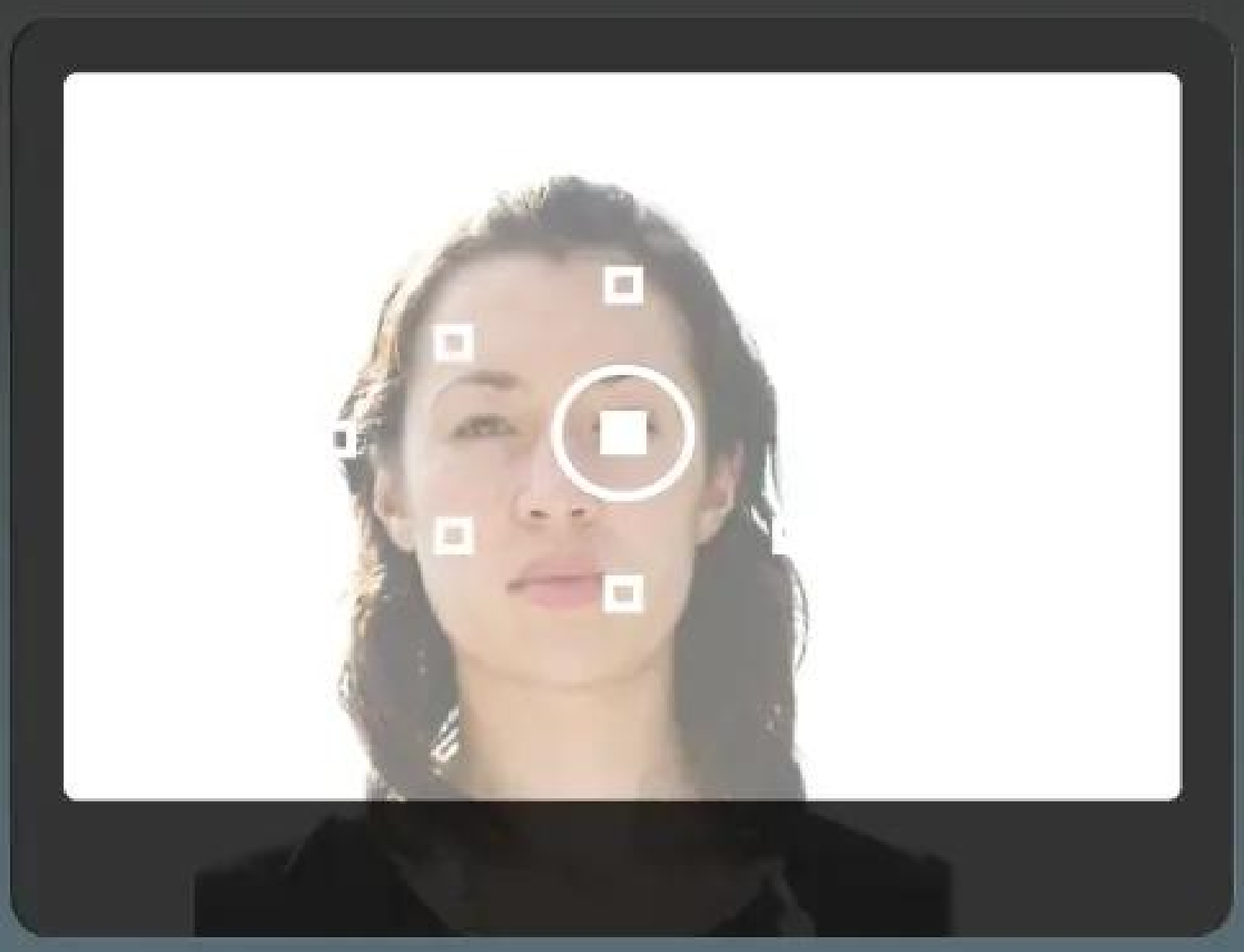
1 Press the button on the camera marked AF, then use the Main Dial on top of the camera to select the One Shot autofocus mode.



2 Press the AF Point Selection button on the top-right corner of the camera, then use the cursor keys or thumbwheel to change the settings.



3 Look in the viewfinder, or on the rear panel, and cycle through the AF Point options until on the central point is selected and lit up.

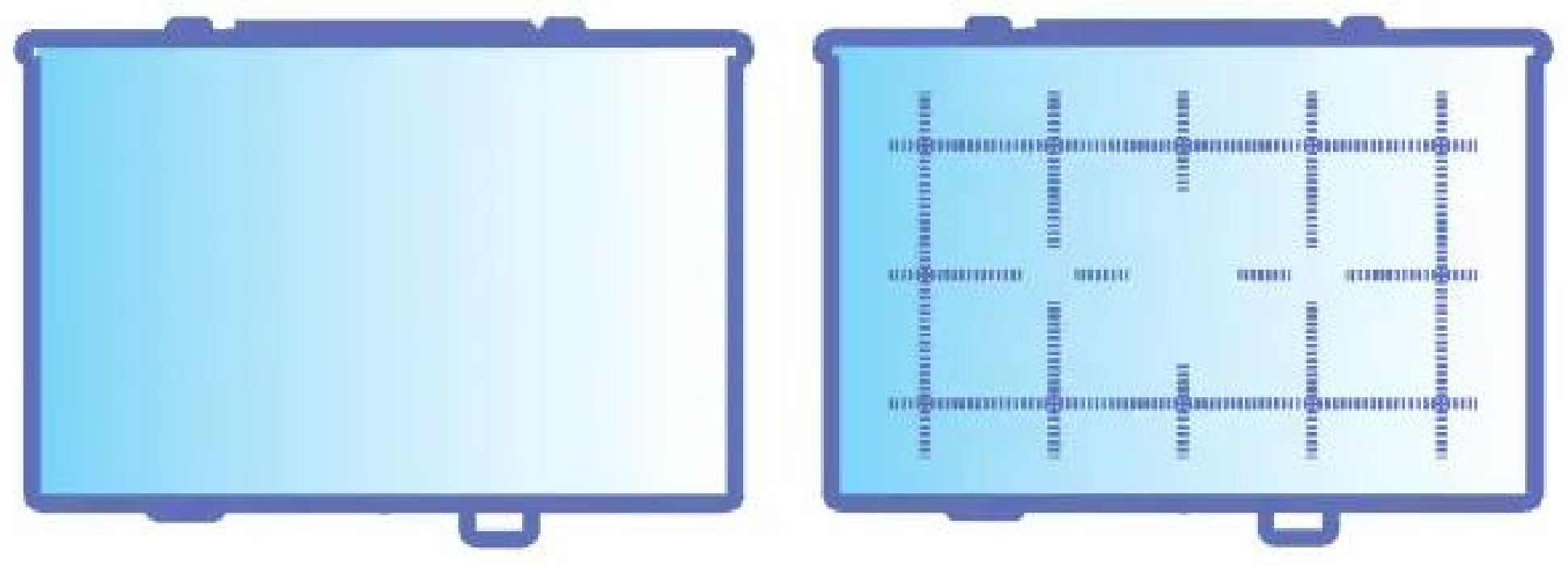


4 Line the viewfinder so that the central point is lined up precisely with the point in the picture you want to focus on (in this example, the girl's eye).

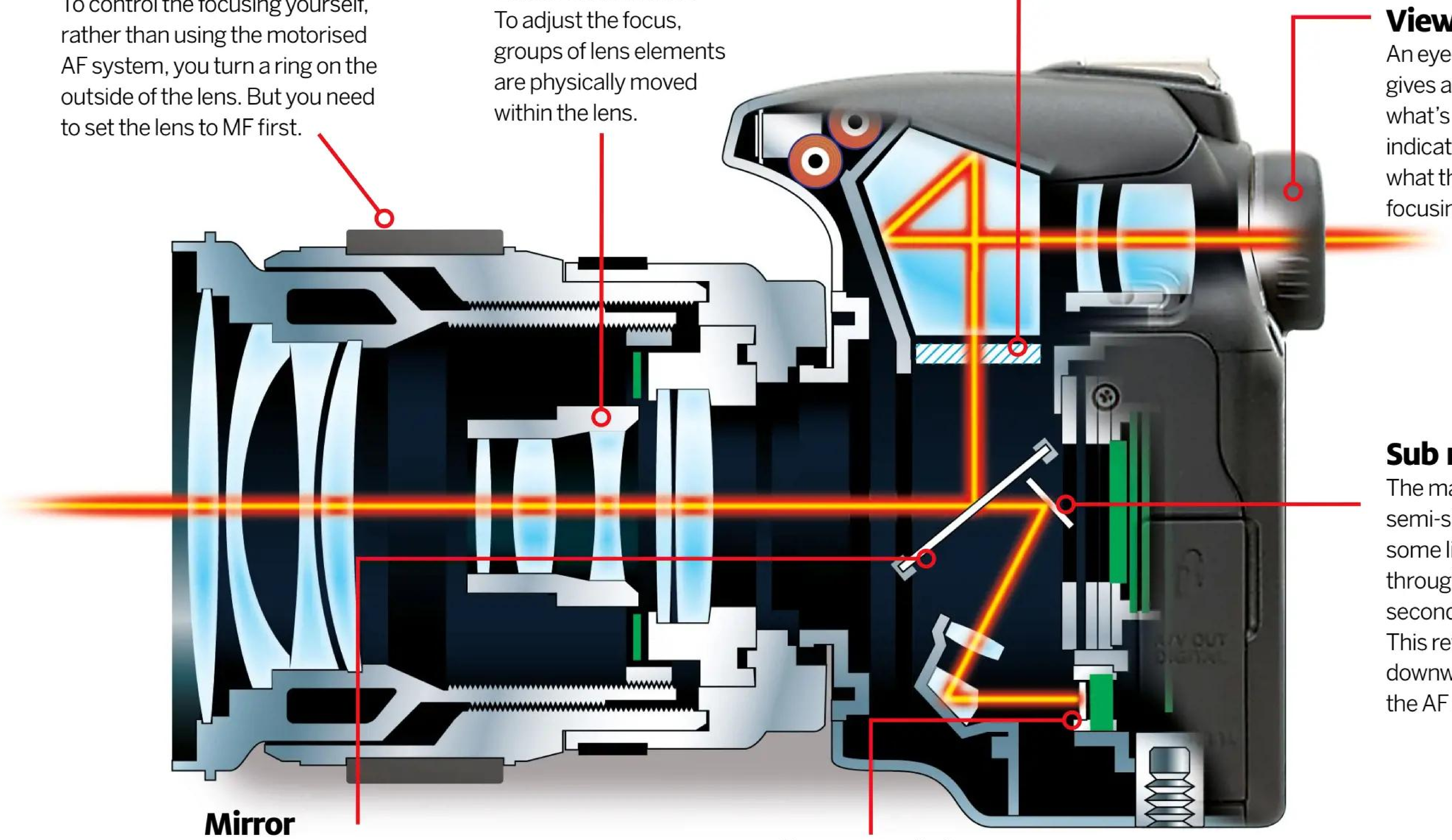
Ways to ensure a sharp picture

Your EOS has more systems and controls for focusing the image than you probably imagined – here's where they are hidden

Focusing screen



Hidden below the pentaprism or pentamirror, the focusing screen is what you see when you look through the viewfinder. Some top models, such as the EOS 80D, allow a choice of optional focus screens (above), which improve accuracy when focusing manually on subjects.



Manual focusing

To control the focusing yourself, rather than using the motorised AF system, you turn a ring on the outside of the lens. But you need to set the lens to MF first.

Lens elements

To adjust the focus, groups of lens elements are physically moved within the lens.

Viewfinder

An eye-level viewfinder gives a visual guide to what's in focus, and indicates when and on what the AF is focusing.

Sub mirror

The main mirror is semi-silvered, allowing some light to pass through it to a hinged secondary sub-mirror. This reflects light downwards, towards the AF module.

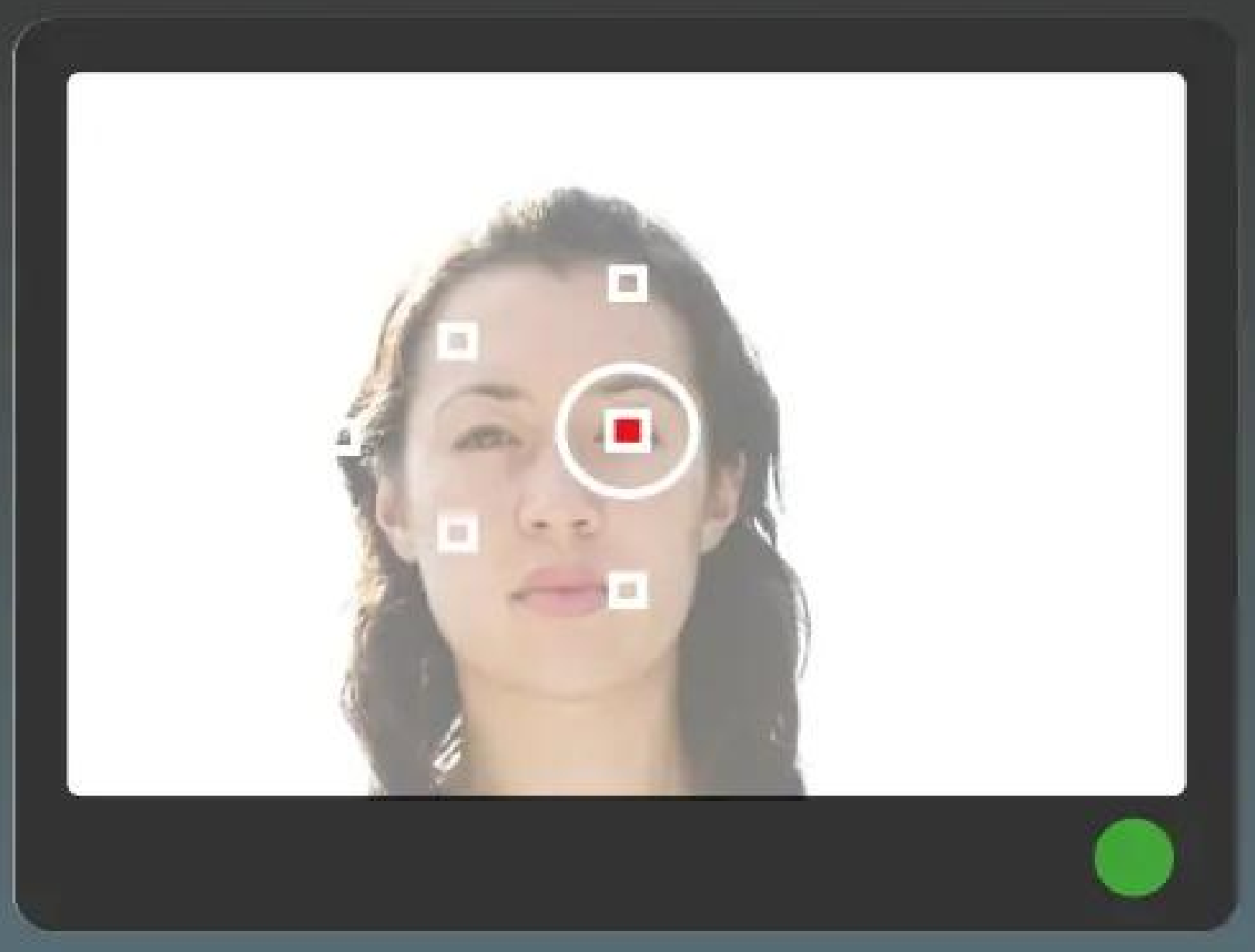
Mirror

The main mirror reflects the image created by the lens so that it appears on the focusing screen. It flips out of the way, then the shutter is fired.

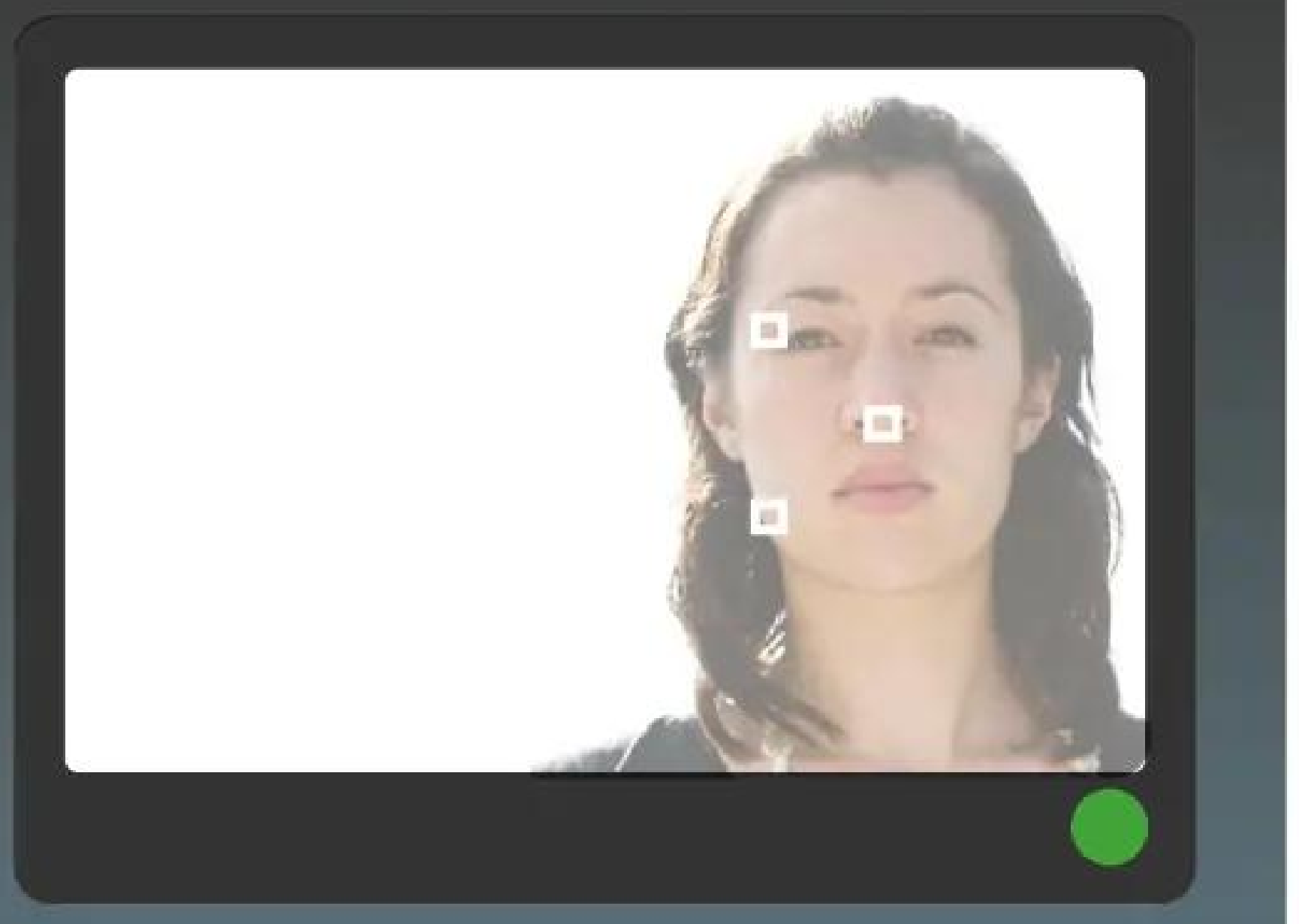
Autofocus module

A dedicated sensor is used to assess the contrast and focus in small areas of the image. Adjustments are then communicated to the lens.

5 Squeeze gently on the shutter release so that it is only slightly depressed. This will activate both the exposure and the autofocus systems.



6 The red LED of the central AF point briefly lights up. The green AF confirmation LED also lights up. Keep the shutter release pressed halfway down.



7 Keeping the trigger half pressed, re-frame the shot as you want it. When in position, press the shutter button all the way down to take the shot.

Adjust for your eyes

In order to see the AF points clearly in the viewfinder, and so you can use the focusing screen to see what is sharp, you may have to adjust the lens in the viewfinder to suit your eyesight. A small knurled wheel by the top-right corner of the eyepiece gives this 'dioptric correction'. Press the shutter release button halfway down, then turn this dioptric correction wheel until the icons and numbers in the viewfinder display look as crisp as possible.

apertures provide better autofocus, as they allow more light to reach the autofocus sensor. In fact, many SLRs have one or more autofocus points that are designed to perform best when used with a lens with an aperture of f/2.8. This setting is crucial, whatever aperture you are using for the shot – as the lens always focuses with the aperture at its widest setting (it only closes down as the shot is taken).

When accuracy counts

The amount of depth of field available is crucial – the wider the aperture you actually take the picture with, the smaller the depth of field and so the more precisely you must focus. Similarly, the closer you are to the subject, and the longer the lens focal length you use, the less leeway you have with focusing accuracy.

Use the tricks and techniques on these pages to learn to increase your focusing accuracy. And remember, to make sure you have a sharp shot, review the image you have just taken and then use the magnify tool to zoom into the part of the image you are interested in, and make sure it appears perfectly in focus on the LCD. ■

ADVANCED TECHNIQUE

Tricks for better manual focusing

How to improve your hit rate when autofocus is switched off

CAMERA MOVEMENT

When focusing on subjects that are just centimetres from the lens, adjusting the focus ring on the lens accurately can prove difficult. With such macro subjects, it can often be easier to fine-tune focusing by moving the camera instead. When the shot is roughly focused, rock forward and backward gently until the subject appears perfectly sharp.

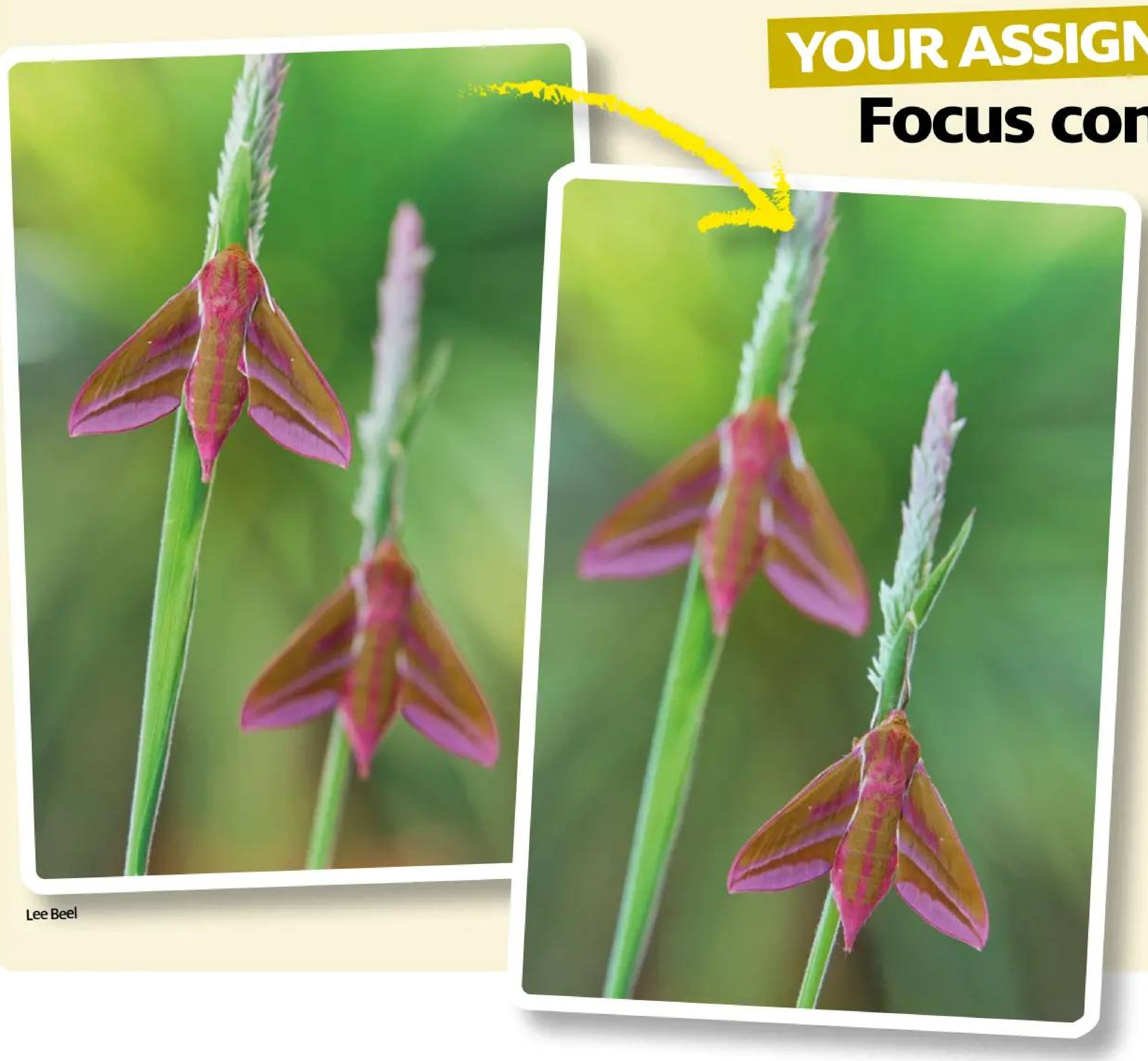
LIVE VIEW

If your camera offers Live View, switch it on when you are focusing manually. The video picture on the back screen is great for pinpoint focusing accuracy, as you can zoom in to this video feed – typically magnifying the image up to 10x, so that any focusing inaccuracy is obvious. Remember to scroll to the area that you want to precisely focus on before adjusting the lens.

USE AN AUTOFOCUS POINT!

Just because you are using manual focus does not mean that the autofocus is completely off. It is still working in 'focus assist' mode, with the red LEDs of the AF points lighting up as the corresponding areas come into focus. When focusing manually, ensure the AF mode is set to the a single AF point, and use the red LED to guide the focus ring to the precise position.

Chris George



Lee Beel

YOUR ASSIGNMENT!

Focus control course work

With every lesson in the Canon SLR College you get some homework to do – to help you put into practice everything you have learnt! To check you now have complete control over focus, find two subjects (two people, say, or two cans from your kitchen cupboard) and place them at different distances from you.

1 **Set up a shot that frames both subjects tightly and has a wide aperture (use Av mode, and use the Main Dial to set aperture to f/4 or f/5.6). Use manual AF point selection to take two shots – first with the nearest subject in focus, then with the furthest subject in focus.**

2 **Repeat the exercise, but this time take the pair of pictures using manual focus. Check all four pictures on your computer, so you can zoom in and check that the subjects that you wanted to be in focus really do look sharp!**

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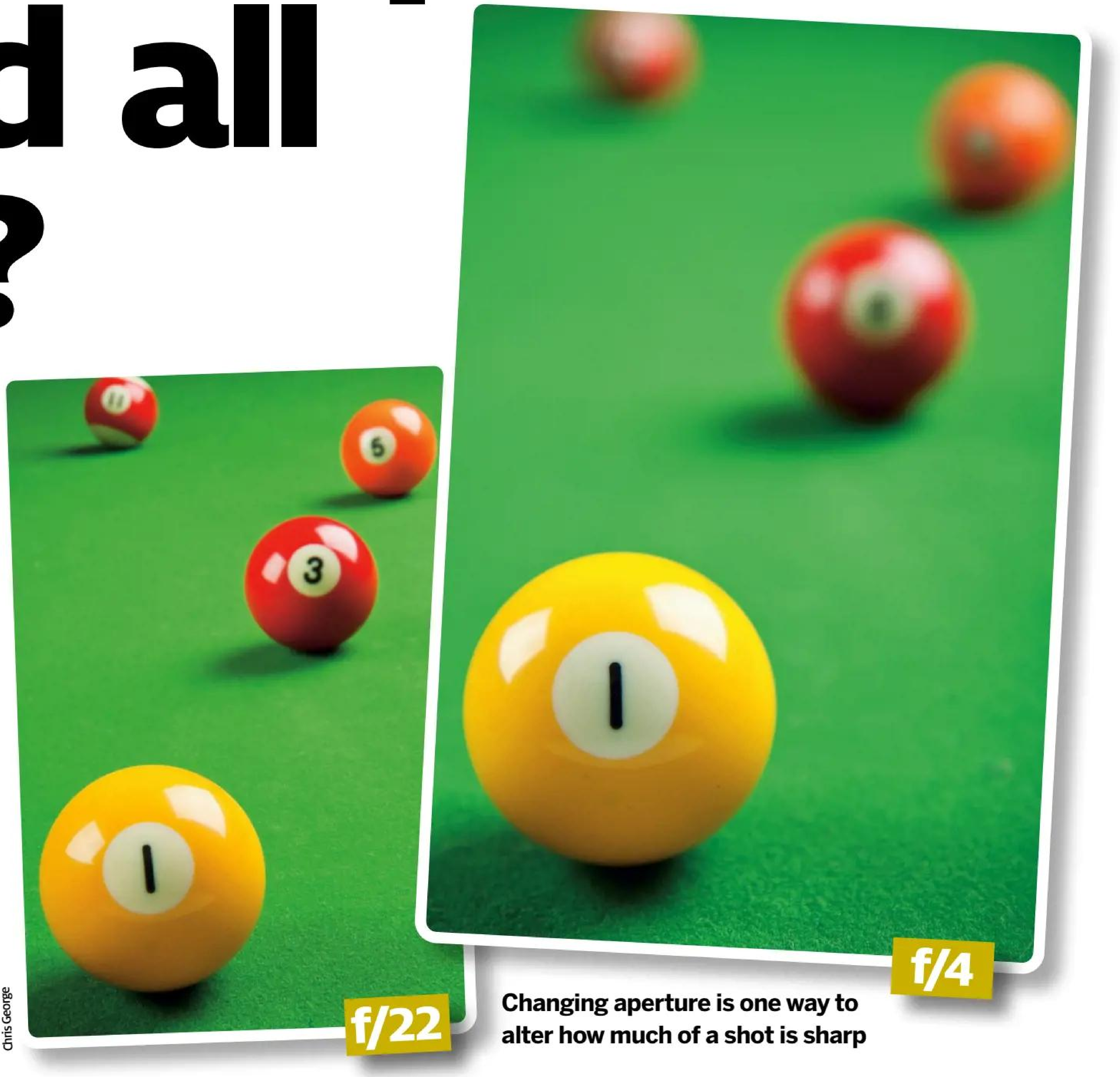
LESSON 3

What is depth of field all about?

The ability to control which parts of your pictures are sharp is one of the main advantages of owning an SLR camera. Look at a scene with your own eyes, and everything from your feet to the horizon is usually in focus. But your pictures do not need to look like this. You can set up your EOS so that only certain parts of the shot are in sharp focus, and others are artistically blurred. This allows you to create emphasis where you want it – and to hide elements that would otherwise prove distracting.

As we explained in the previous lesson, your lens can only focus sharply at one distance. However, due to an optical property known as 'depth of field' a range of distances will actually appear sharp. This zone of sharpness will vary enormously. Focus in close on a ladybird with a macro lens and depth of field may only stretch for a couple of millimetres behind and in front of the spot ▶



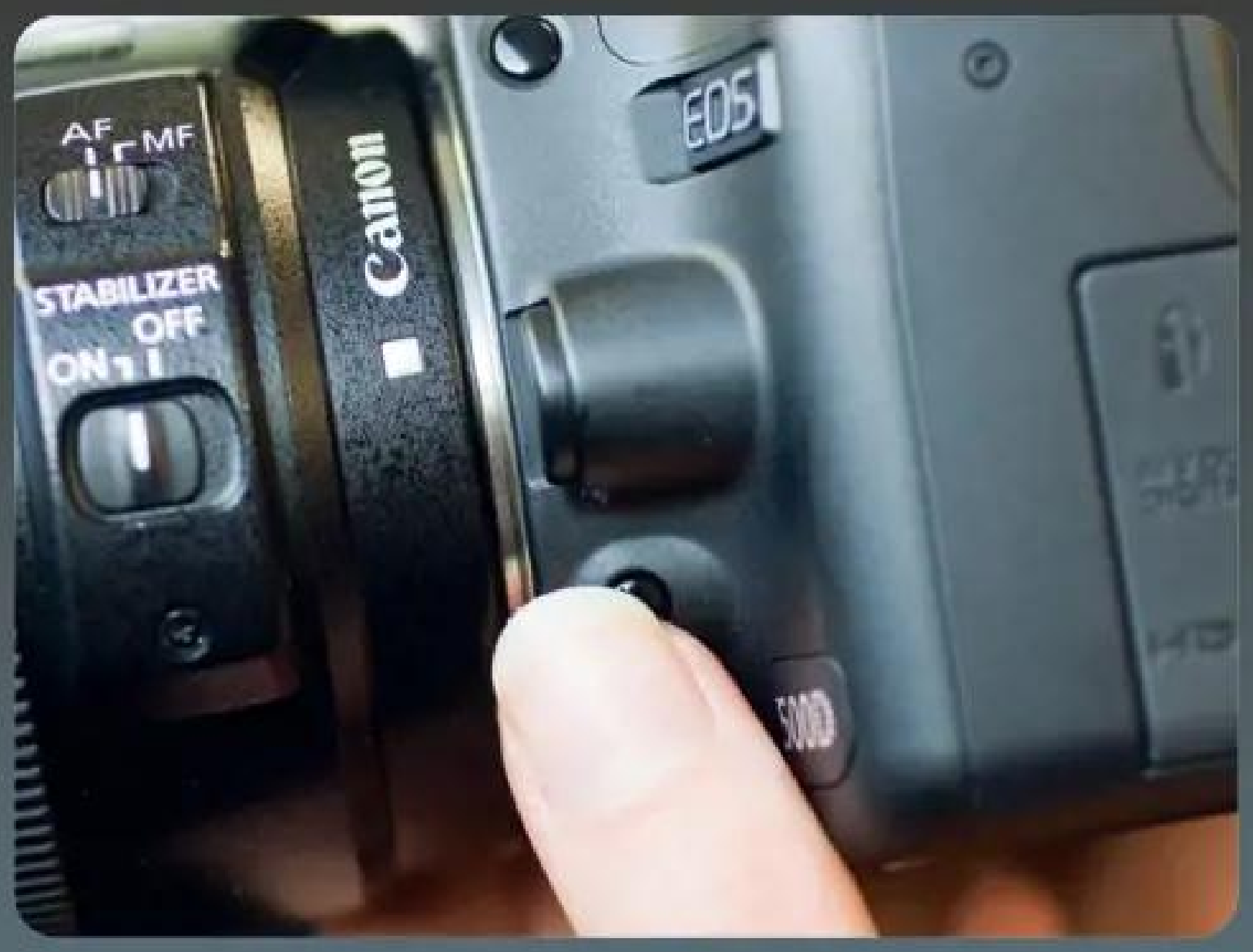
Changing aperture is one way to alter how much of a shot is sharp

Chris George

STEP BY STEP How to preview depth of field

15 22 ISO 400 9

1 When you look through the viewfinder, you see the scene using your lens's widest aperture. So what you see is the minimum depth of field you can get for the lens and distance set.



2 Press the button on the front of your EOS (below the lens release button) while looking through the viewfinder, and the aperture closes down to the aperture you're using.

15 22 ISO 400 9

3 With this Depth of Field Preview button pressed, the viewfinder may darken (depending on the aperture set) however you can see which parts of the image will be sharp.

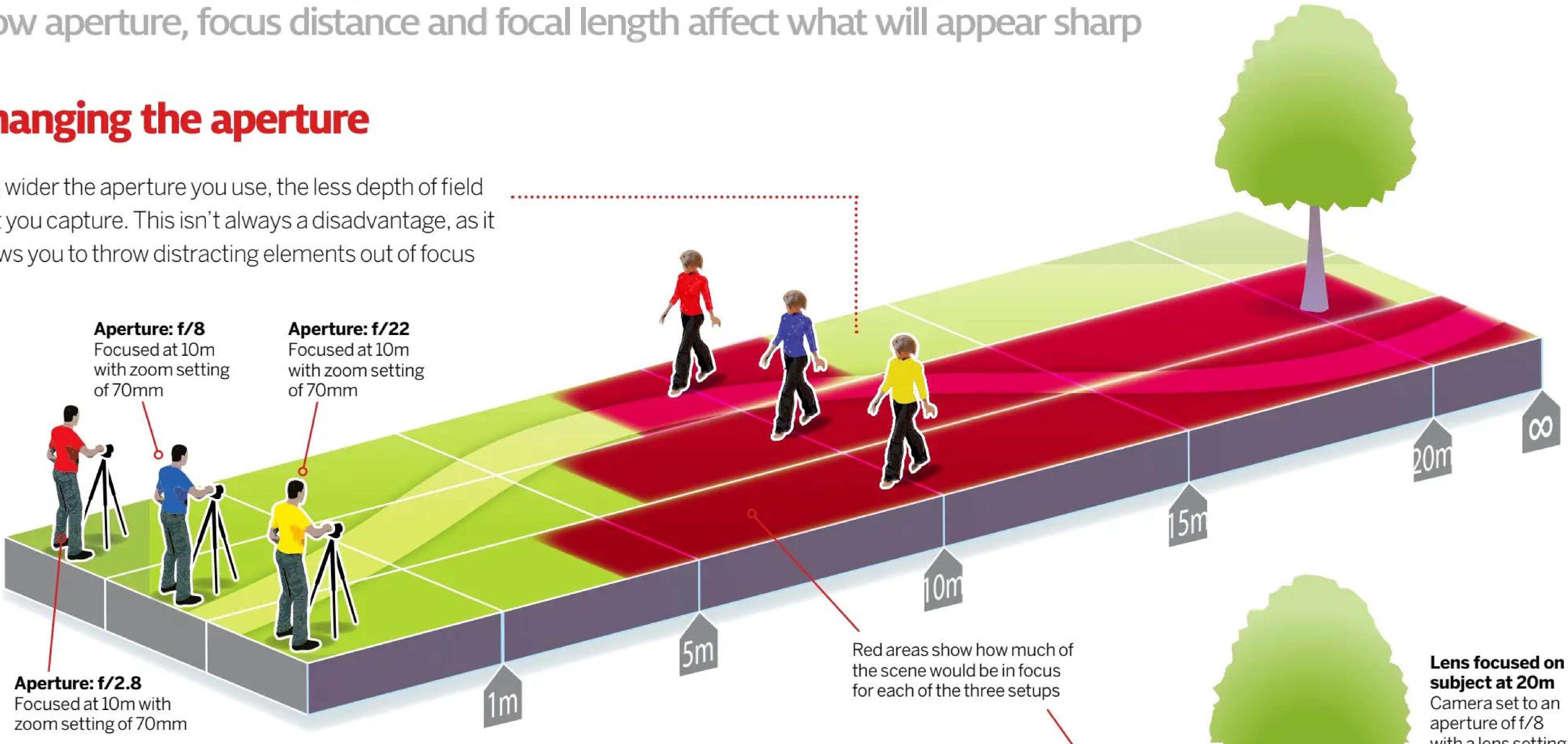
4 To get a better preview of how much depth of field you have with your current settings simply shoot a test picture, press the Playback button, and zoom in using the magnification key.

Three ways to affect depth of field

How aperture, focus distance and focal length affect what will appear sharp

Changing the aperture

The wider the aperture you use, the less depth of field that you capture. This isn't always a disadvantage, as it allows you to throw distracting elements out of focus

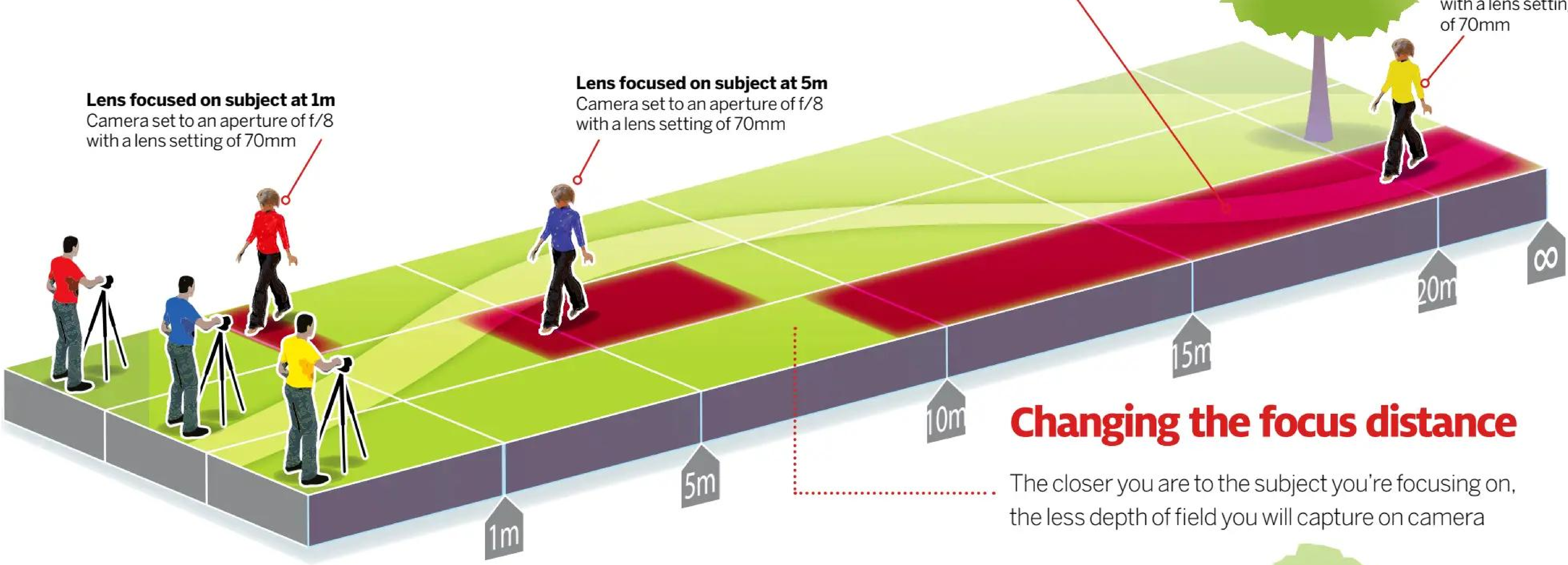


Aperture: f/8
Focused at 10m with zoom setting of 70mm

Aperture: f/22
Focused at 10m with zoom setting of 70mm

Aperture: f/2.8
Focused at 10m with zoom setting of 70mm

Red areas show how much of the scene would be in focus for each of the three setups



Lens focused on subject at 20m
Camera set to an aperture of f/8 with a lens setting of 70mm

Lens focused on subject at 1m
Camera set to an aperture of f/8 with a lens setting of 70mm

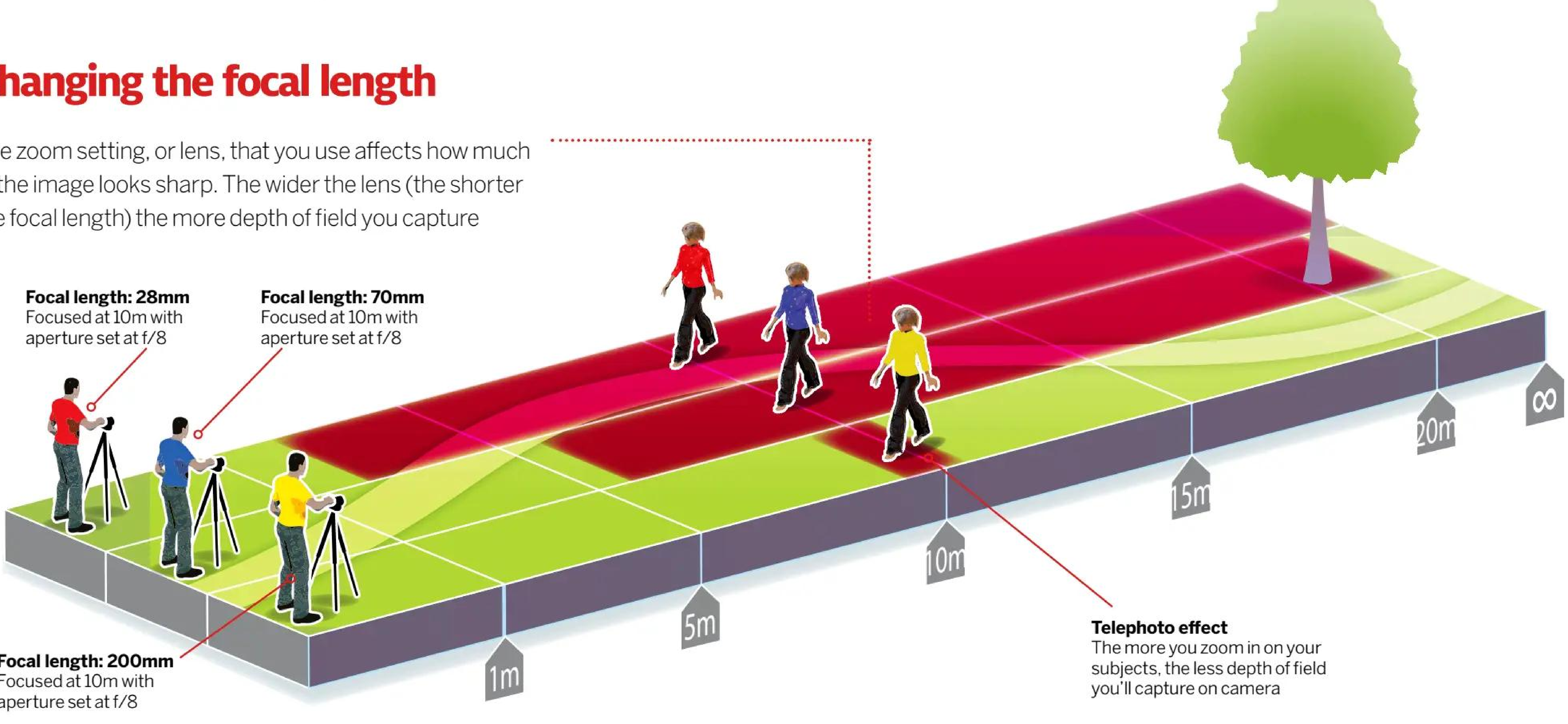
Lens focused on subject at 5m
Camera set to an aperture of f/8 with a lens setting of 70mm

Changing the focus distance

The closer you are to the subject you're focusing on, the less depth of field you will capture on camera

Changing the focal length

The zoom setting, or lens, that you use affects how much of the image looks sharp. The wider the lens (the shorter the focal length) the more depth of field you capture



Focal length: 28mm
Focused at 10m with aperture set at f/8

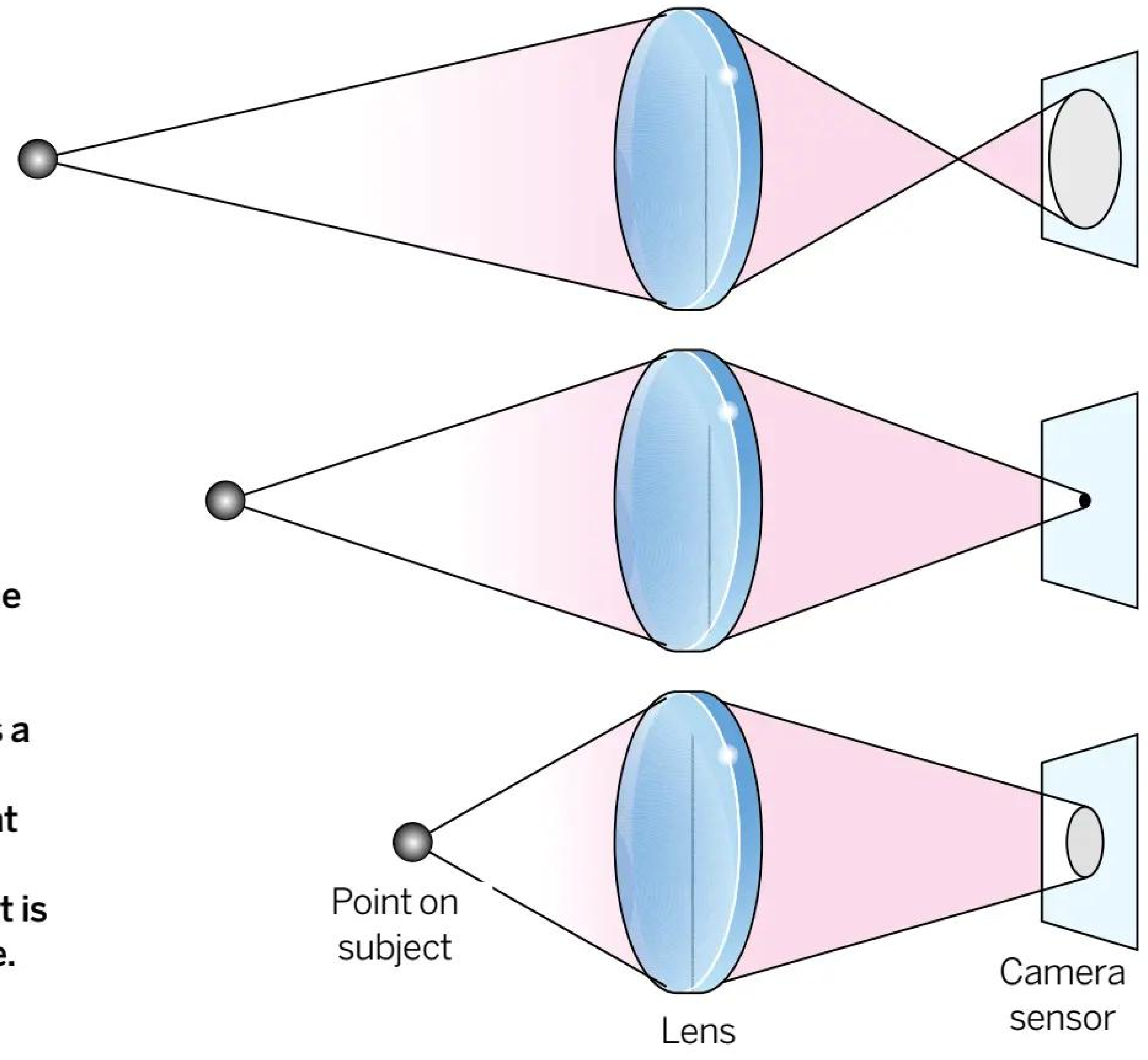
Focal length: 70mm
Focused at 10m with aperture set at f/8

Focal length: 200mm
Focused at 10m with aperture set at f/8

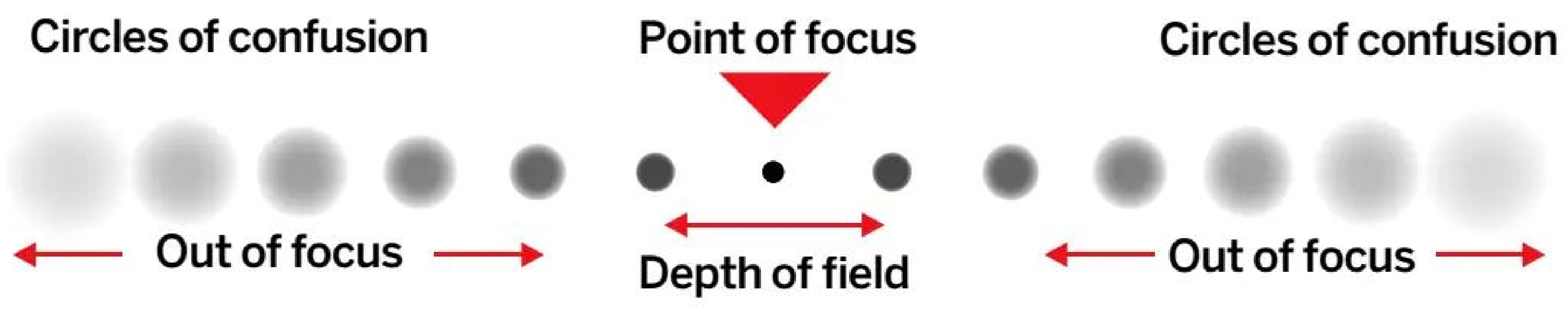
Telephoto effect
The more you zoom in on your subjects, the less depth of field you'll capture on camera

The science of circles

What happens when things are not quite in focus



A single point on the subject is only registered on the camera's sensor as a point if the lens is precisely focused at the right distance. Otherwise the point is recorded as a circle.



The further away the point in the picture is from the point of focus, the bigger the circle (known as a 'circle of confusion'). If the circle is small enough, it will still looks like a point on the picture – and this creates the 'acceptably sharp' range known as the depth of field

you have focused on. Switch to shooting a sweeping panorama and everything from the flowers by your boots to the mountains in the far distance on the horizon can be made to appear pin sharp.

For most subjects, depth of field extends noticeably further behind the subject than in front, but the exact split varies depending on the subject.

There are three key factors for controlling the exact amount of depth of field that you get for any given picture. The best known of these is aperture (the size of the iris-like opening in the lens). The narrower the aperture becomes (the smaller the f/number) the more depth of field you can capture. There are several EOS modes that allow you to set the aperture, and thus change depth of field – we'll look at these in more detail in a later lesson. However, the best one to use is the Av mode (or Aperture Priority). Set the top dial on your DSLR to Av, then you can rotate the wheel behind the shutter button to change the aperture setting – while your camera automatically adjusts the shutter speed – to capture an accurate exposure.

Use a wide aperture (such as f/4) if you want to restrict the zone of focus and capture a shallow depth of field. Or if you want to make sure as much of the shot is as sharp as possible, close down the aperture to a narrower setting (such as f/22) to capture a greater depth of field.

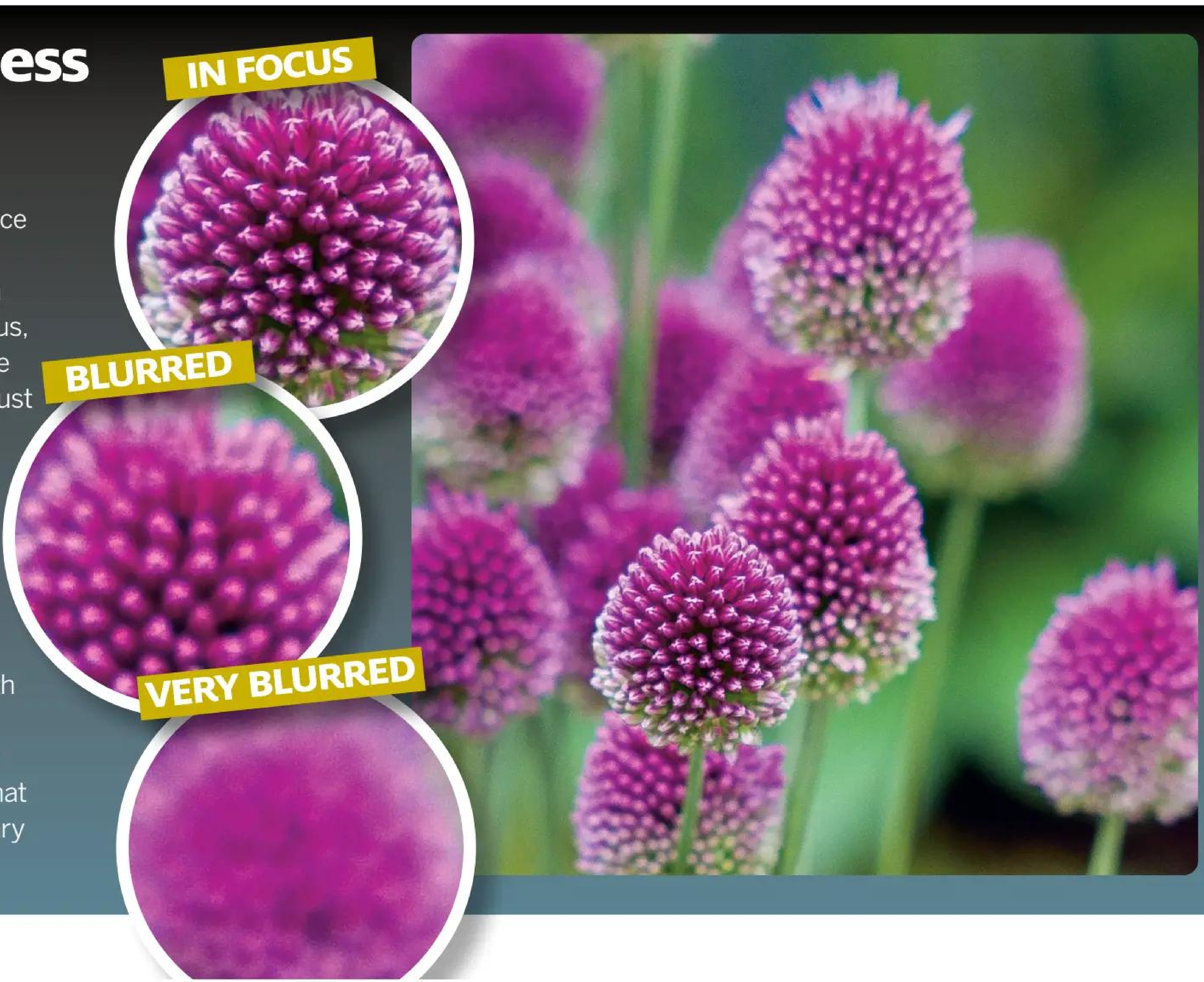
Controlling depth of field

The handy thing about using aperture to control depth of field is that it can be altered without changing your camera setup. However, for ultimate control, you need to harness the other two key factors that dictate the amount of depth of field that you capture.

The first is the focal length of the lens you're using. As you zoom into your subject, the amount of depth of

Degrees of sharpness

While talk of circles of confusion can seem confusing (see above), this optical property does have relevance in everyday photography. The key point to remember is that depth of field is not simply a case of which bits of the picture are out of focus, and which are sharp. The amount of blur in the out of focus areas varies too. Things that are just outside of the depth of field zone are still recognisable, even if they are not tack sharp. It's often useful in photography to throw certain areas (normally the background) so far out of focus that they're completely blurred and no longer a visual distraction. In order to do this, you need to restrict the depth of field even further than the basic depth of field calculations suggest. It's for these reasons that professional photographers buy lenses with the widest maximum apertures that they can afford, allowing them, when necessary to restrict depth of field as much as possible.



Chris George

field that you get reduces. Wide-angle lenses, by definition, offer much greater depth of field than telephoto ones. So for keeping everything in the frame sharp, a composition with a wide lens setting of 18mm, or wider, is a good start. Similarly, if you want to blur the background as much as possible, switch to a long telephoto lens with a focal length of, say, 200mm.

The final piece in the jigsaw is the distance from you to your subject – or to put it more accurately, the distance that the lens is focused on. The closer your lens is focused, the less depth of field you'll capture. Inevitably, to become a master of depth of field, you need to use all three factors in unison.

To maximise the amount of depth of field, use a wide focal length setting, a narrow aperture, and don't focus on anything too close to the camera.

And if you want to keep backgrounds artistically blurred, drawing attention to just a single part of the scene, use the longest telephoto setting you can get away with, set the widest aperture the lens offers, and get as close as possible to your subject.

Accurate preview

Because of the way that your viewfinder works, you won't be able to see the effect of depth of field accurately as you frame up your picture. What you see roughly is the amount of depth of field you would get if you were to use the widest aperture available on the lens you are currently using. There is a Depth of Field Preview facility, but as this makes the viewfinder much darker in order to show you exactly what is sharper, it is very hard to interpret accurately. In order to experiment with depth of field, it is often best to simply shoot a picture – then review it on your LCD, zooming in and scrolling around so that you can see exactly which parts of your image are sharp. ■

Jargon Buster

Depth of field

A measure of how much of a picture is in focus, from the nearest point in the scene to the camera, to the furthermost point that looks sharp. The amount of depth of field is dependent on the aperture, the distance that the lens is focused at, and the focal length of the lens.

YOUR ASSIGNMENT! Try this depth of field exercise

This lesson's homework is designed to improve your knowledge of depth of field – and how to maximise or minimise it in your pictures.

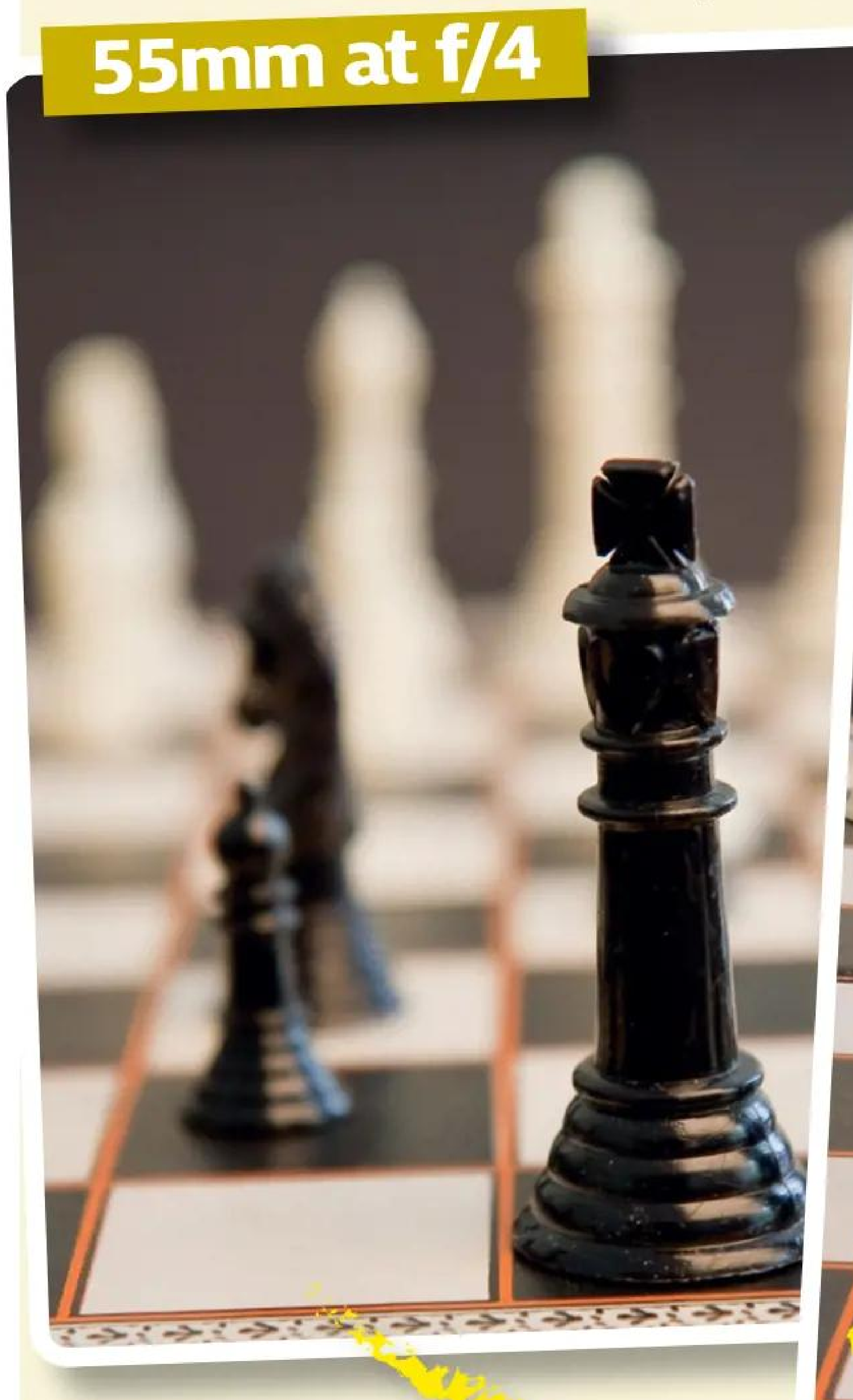
As depth of field is more limited with close-up subjects, we are going to use a table-top still life for this subject. We've used a chessboard laid out with all its pieces – but you could just as easily set out the bottles and cans from your kitchen cupboard.

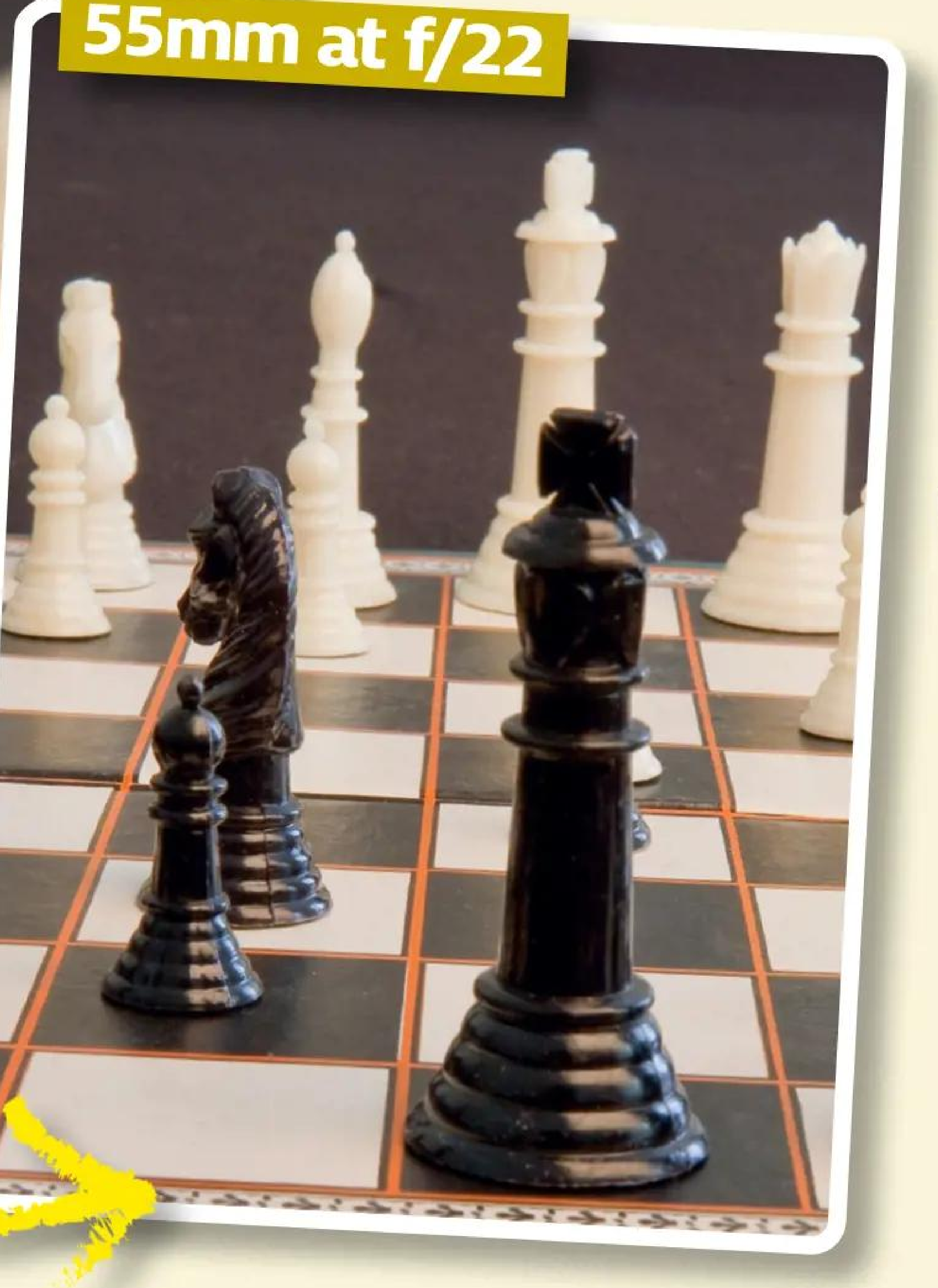
Use a tripod, if you have one, as this will help eliminate camera shake from the equation – so that the only blur you get in your image is created by the limits of depth of field. If you don't have one, use a brightly lit room and a high ISO (eg ISO1000), to ensure you can use a full range of apertures.

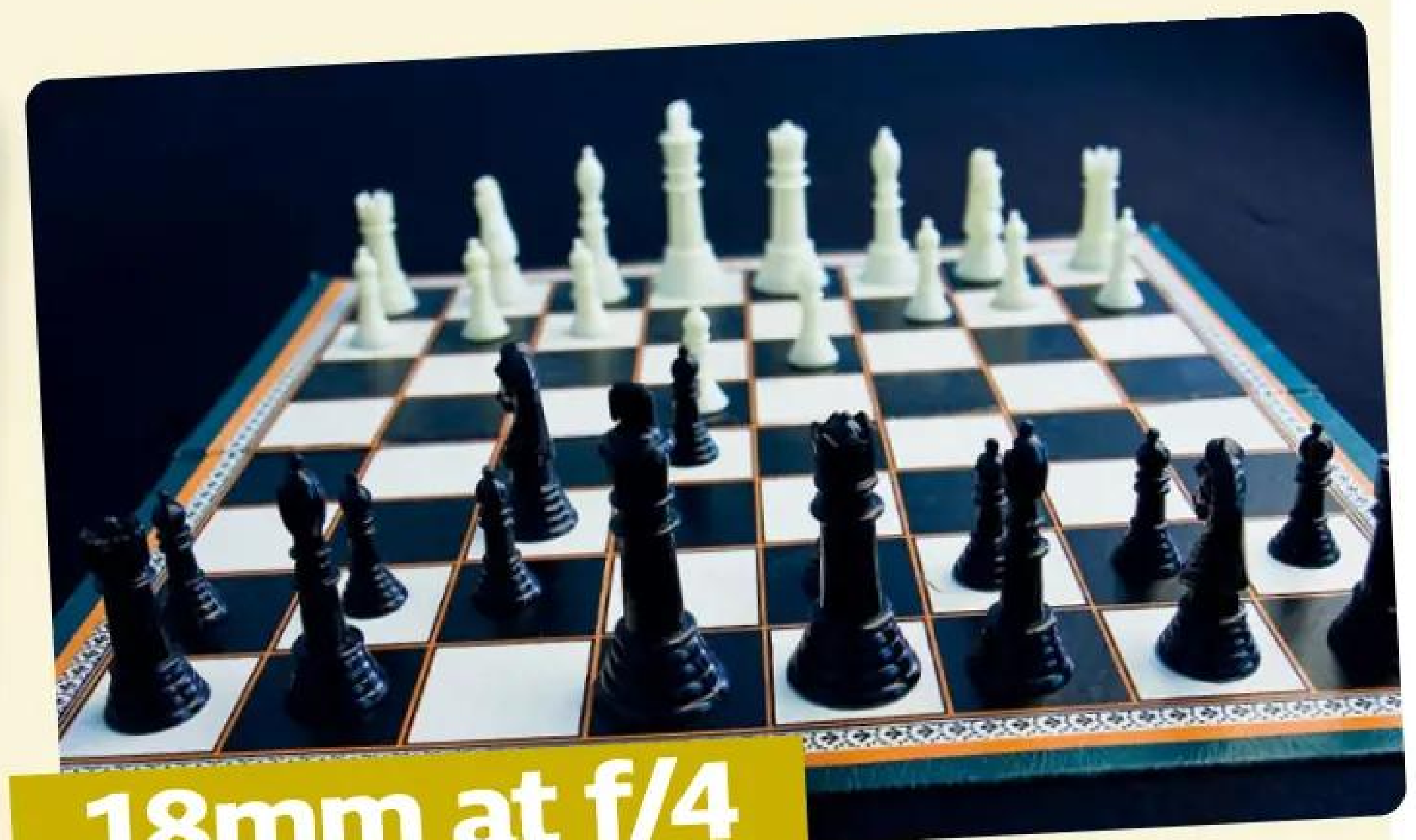
1 Frame your objects using the most telephoto setting of your standard zoom (usually 55mm), and focus on the object nearest to you. Set the mode to Av, and turn the Main Dial anti-clockwise until the aperture is open as wide as possible (usually f/4 or f/5.6). Take a picture. Now take a second shot with the same setup, but with the aperture at f/22.

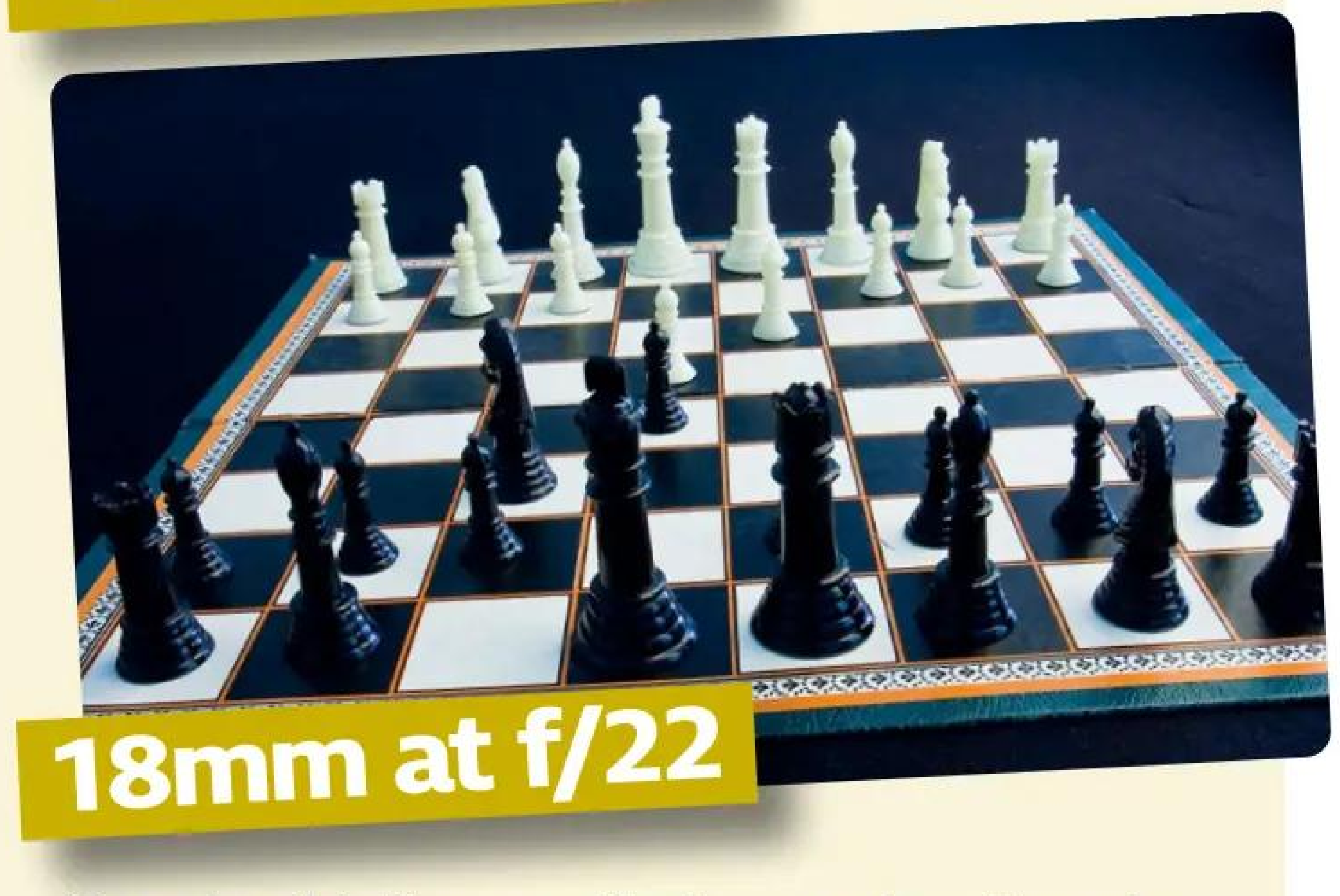
2 Zoom out to use the widest zoom setting available (usually 18mm). Take one shot at the wide aperture used in Step 1, and one at f/22. Don't worry if your subjects only occupy the central part of the frame.

3 Look at all four images on your computer, zooming to see which subjects look sharp, and noting the degree of blur in different parts of your pictures.


55mm at f/4


55mm at f/22


18mm at f/4


18mm at f/22

You should discover that even shooting at f/22 you won't get everything sharp, but zooming out gives much more depth of field

LESSON 4

What's aperture all about?

Altering the aperture is one of the photographer's most potent weapons, but this apparently simple control can lead to confusion. The exact setting used can create varied – and seemingly contradictory – effects. And then there is the peculiar number scale used – the numbers themselves appear randomly generated, and arranged in the wrong order!

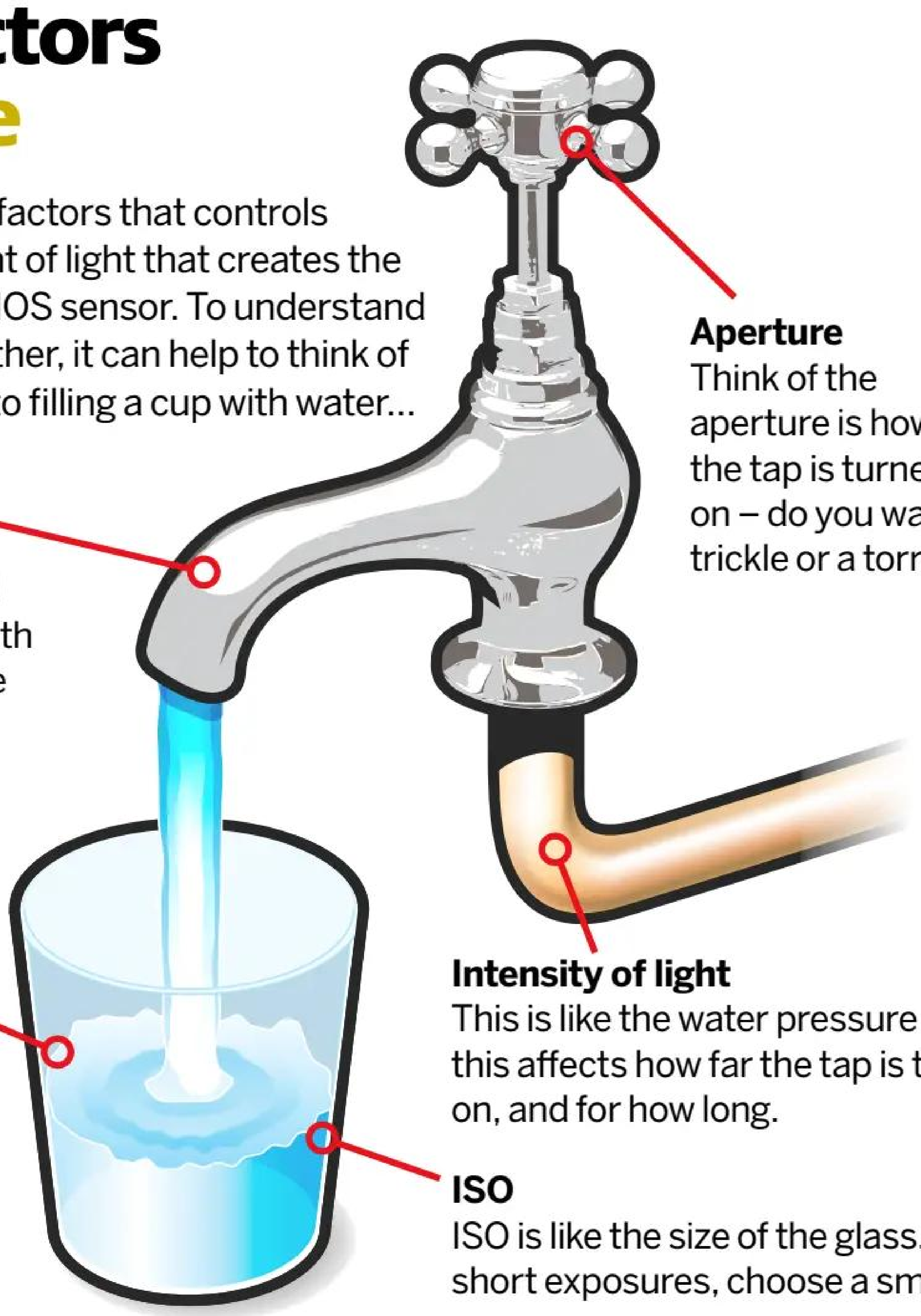
First and foremost, the aperture is a simple hole – an opening that can be varied in size, so as to control the amount of light reaching the camera sensor. Used in conjunction with shutter speed (the length of time the sensor is exposed to light), the aperture lets you match the exposure to the brightness of the scene. The wider the hole, the more light that is let in – helping you to compensate for darker conditions, say, or letting you use a faster shutter speed.

The aperture is not actually in the camera – but in the lens. As a DSLR's lens is interchangeable, the range of aperture settings available varies depending on the particular lens used. Notably, expensive lenses tend to have significantly wider maximum apertures than budget zooms.

What frustrates everyone new to photography is the f/stop scale used to measure the size of the aperture. The strange numbering system, however, is not random. The first thing to realise is that the numbers are not integers, but fractions. So f/4 is not 4 but a quarter ▶

The key factors in exposure

Aperture is just one of the factors that controls exposure – and the amount of light that creates the image on the camera's CMOS sensor. To understand how the factors work together, it can help to think of exposure as being similar to filling a cup with water…



Aperture
Think of the aperture is how far the tap is turned on – do you want a trickle or a torrent?

Shutter speed
Think of this as the amount of time the tap is left turned on. It works hand in hand with aperture – you can have the tap on full for a short time, or open just a little bit for longer to get the same volume of water.

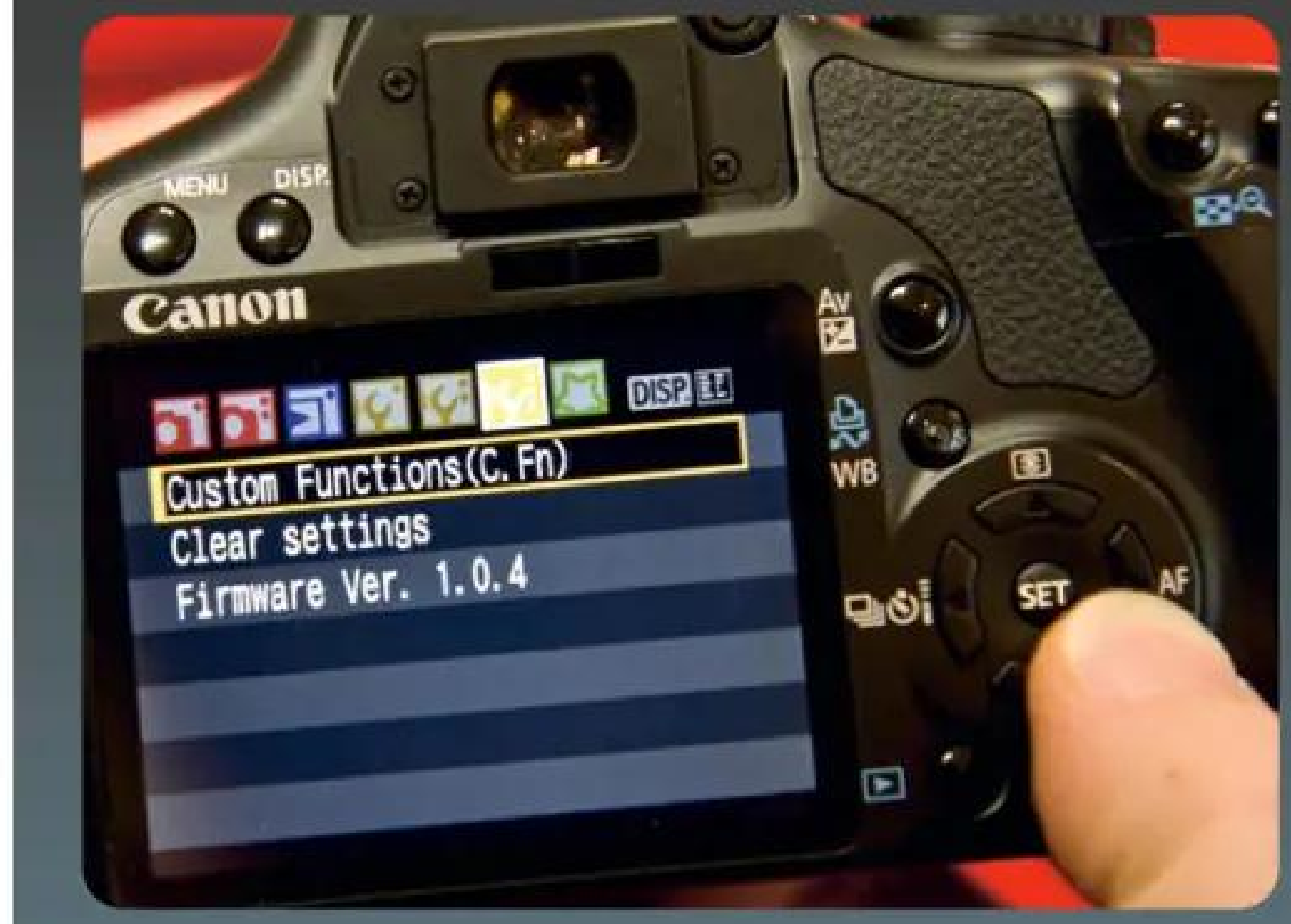
A matter of taste
Exposure is not all about science – it is also about artistic interpretation. Exactly how full do you prefer your cup of water to be?

Intensity of light
This is like the water pressure – and this affects how far the tap is turned on, and for how long.

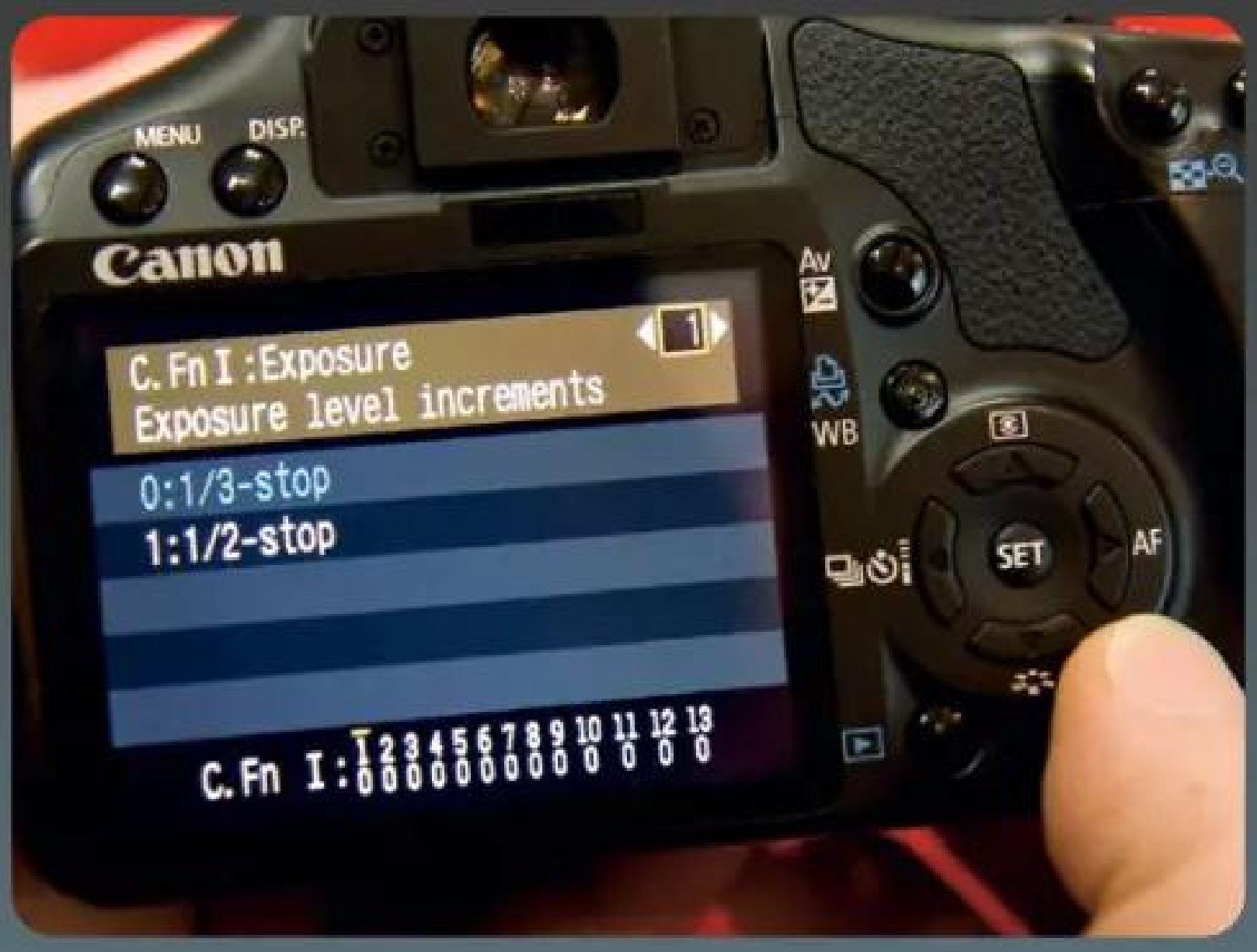
ISO
ISO is like the size of the glass. For short exposures, choose a small cup!

Illustration: Andy McLaughlin

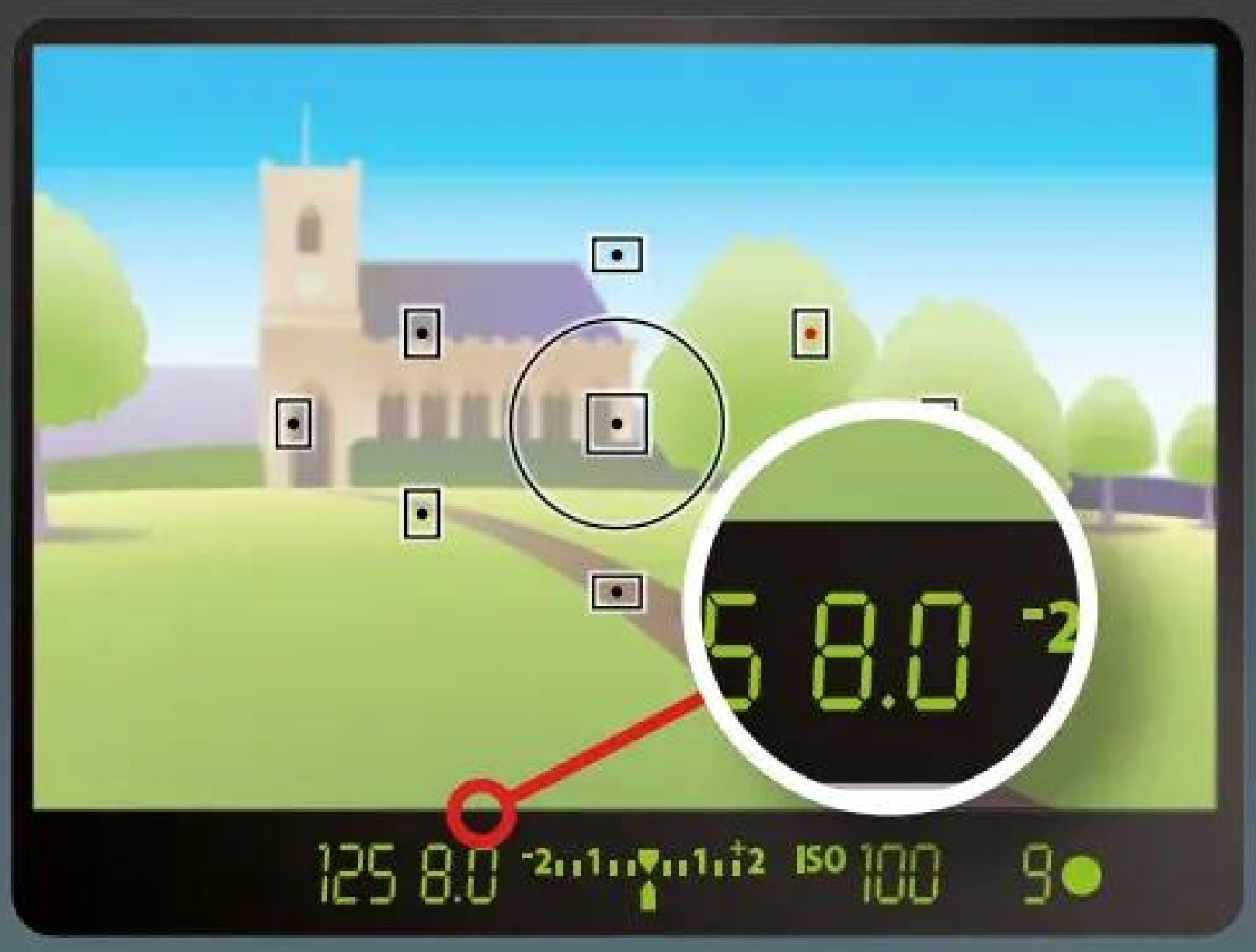
STEP BY STEP How to control aperture



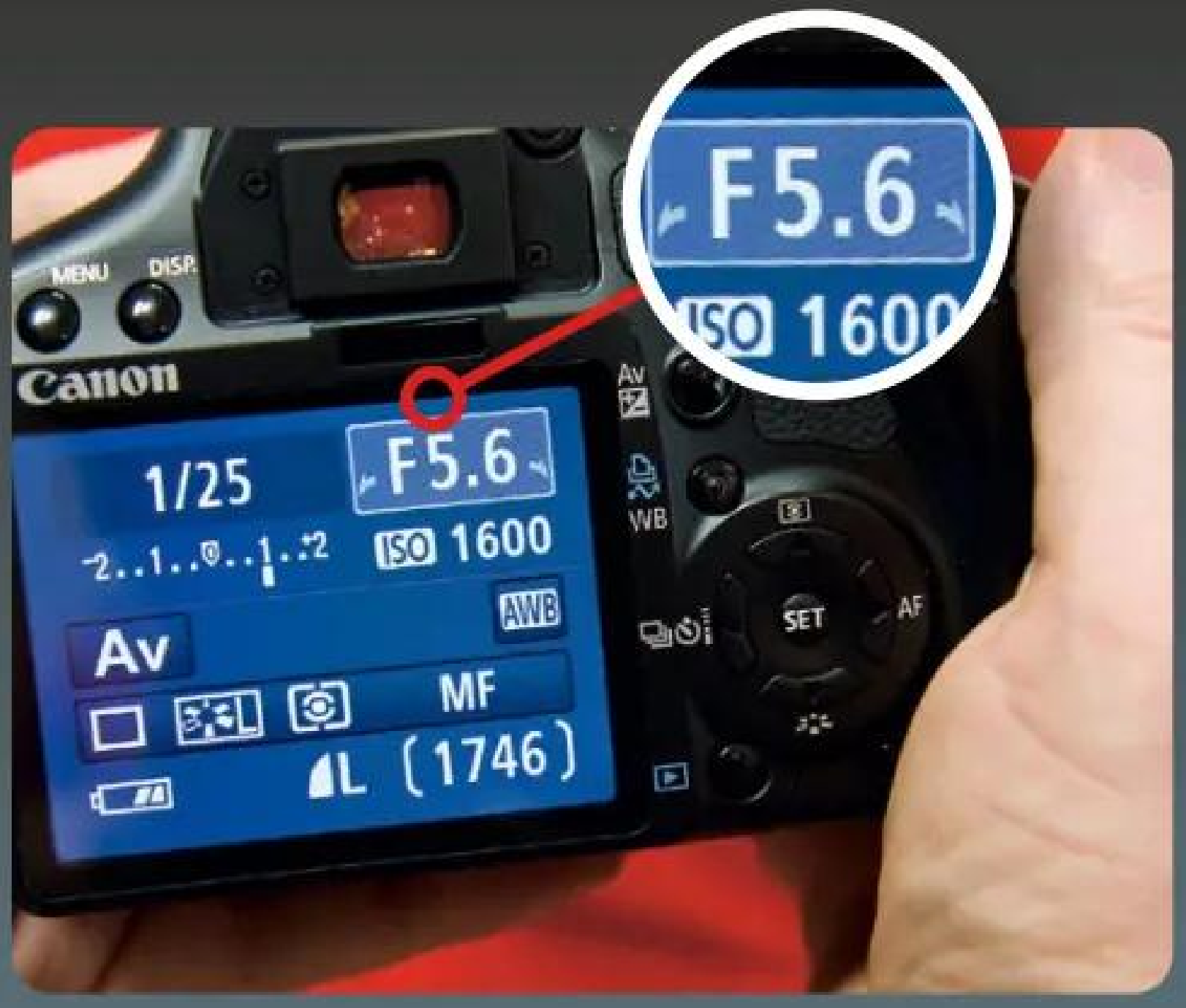
1 You have a choice of aperture scales – with half-stop or third-stop steps. To switch, press the Menu button and scroll to the Custom Function options.



2 The exact Custom Function number varies; the one you want is called Exposure Level Increments. Scroll to the one you'd like to use, then press Set.



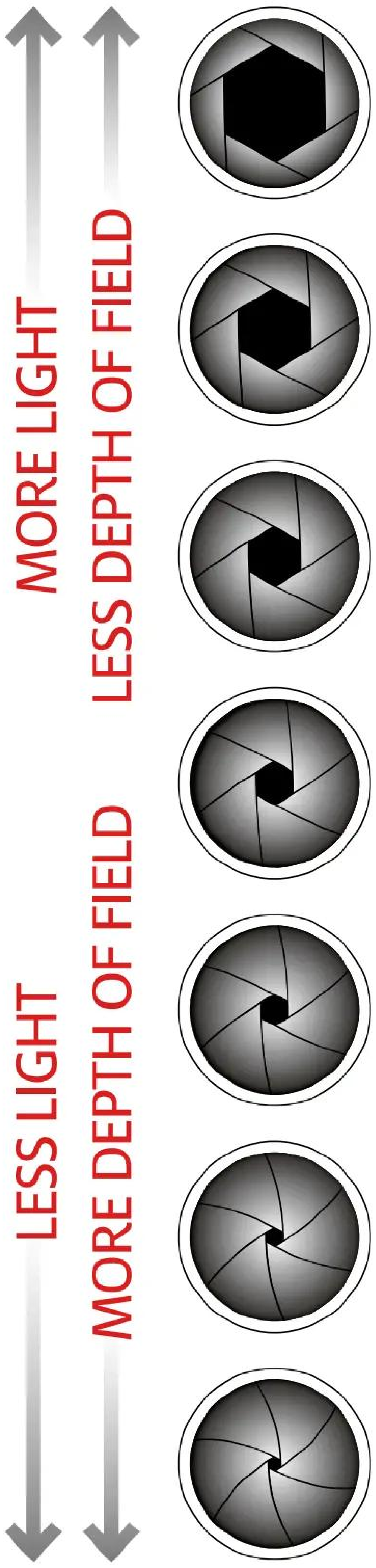
3 The best place to see the aperture you are using is in the viewfinder. Half press the shutter button; the aperture is the number second from the left.



4 For an alternative view, many Canon DSLRs also show you the aperture you are using on the rear LCD. Again, half-press the trigger to fire up the metering.

Making sense of f-stops

An at-a-glance guide to aperture scales, and what the settings mean



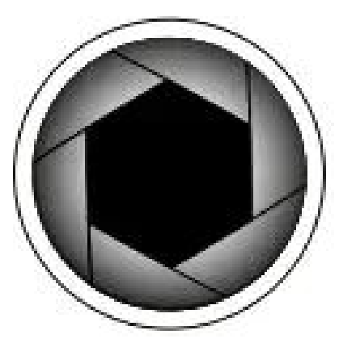
Full stops	1/2 stops	1/3rd stops
f/2.8	2.8	2.8
		3.2
	3.5	
		3.5
f/4	4	4
		4.5
	4.5	
		5
f/5.6	5.6	5.6
		6.3
	6.7	
		7.1
f/8	8	8
		9
	9.5	
		10
f/11	11	11
		13
	13	
		14
f/16	16	16
		19
	19	
		20
f/22	22	22

ONE STOP

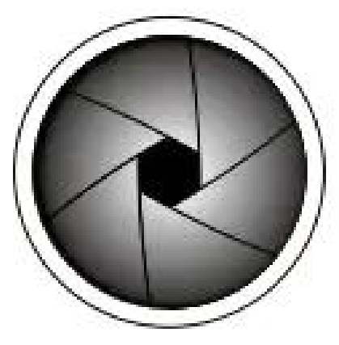
TWO STOPS

WIDE APERTURES

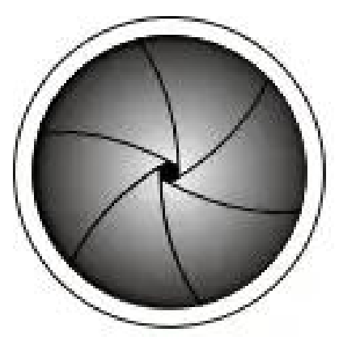
SMALL APERTURES



Wide apertures
The widest apertures have the f/stops with the smallest numbers. The widest 'maximum' aperture available depends on the lens you are using. On many zooms, the maximum aperture gets smaller as you zoom in.



Mid apertures
The middle apertures on your lens tend to give you the best quality images – although they may not give you the amount of depth of field you require.



Narrow apertures
Most lenses have a minimum aperture of f/22, although some may offer smaller settings of, say, f/25 or f/32. As the aperture gets smaller the more depth of field you get, but image resolution deteriorates due to a phenomenon called diffraction.

5.0
WB
AF•DRIVE
ISO
AWB
200
5.0
246
ONE SHOT
RAW
1600

5 Top-end DSLRs, like the 50D and 7D, have a top-plate LCD screen, which gives you an easy-to-see readout of your exposure settings, including aperture.

A-DEP
M
Av
Tv
P
ISO
ON
OFF

6 The easy way to control the aperture setting yourself is to switch to Av mode – then turn the wheel by the trigger until you get the value that you want.

Proportional representation

F-stops are not a physical measurement of the diameter of the aperture – they simply express a ratio between the diameter of a focal length. On a 400mm lens, an aperture of f/8 has a diameter of 50mm. A 100mm lens set to f/8 will let in as much light – but the aperture's diameter will be 12.5mm. With a zoom lens, the aperture needs to open up wider as you zoom in – even if the f/stop number set on the camera remains exactly the same!

(1/4). This explains why f/16 is a smaller aperture than f/4. By "f/4", we are saying that the aperture diameter is "the focal length of the lens (f) divided by 4". And a setting of f/16 means the diameter of the aperture opening is a sixteenth of the focal length we are using.

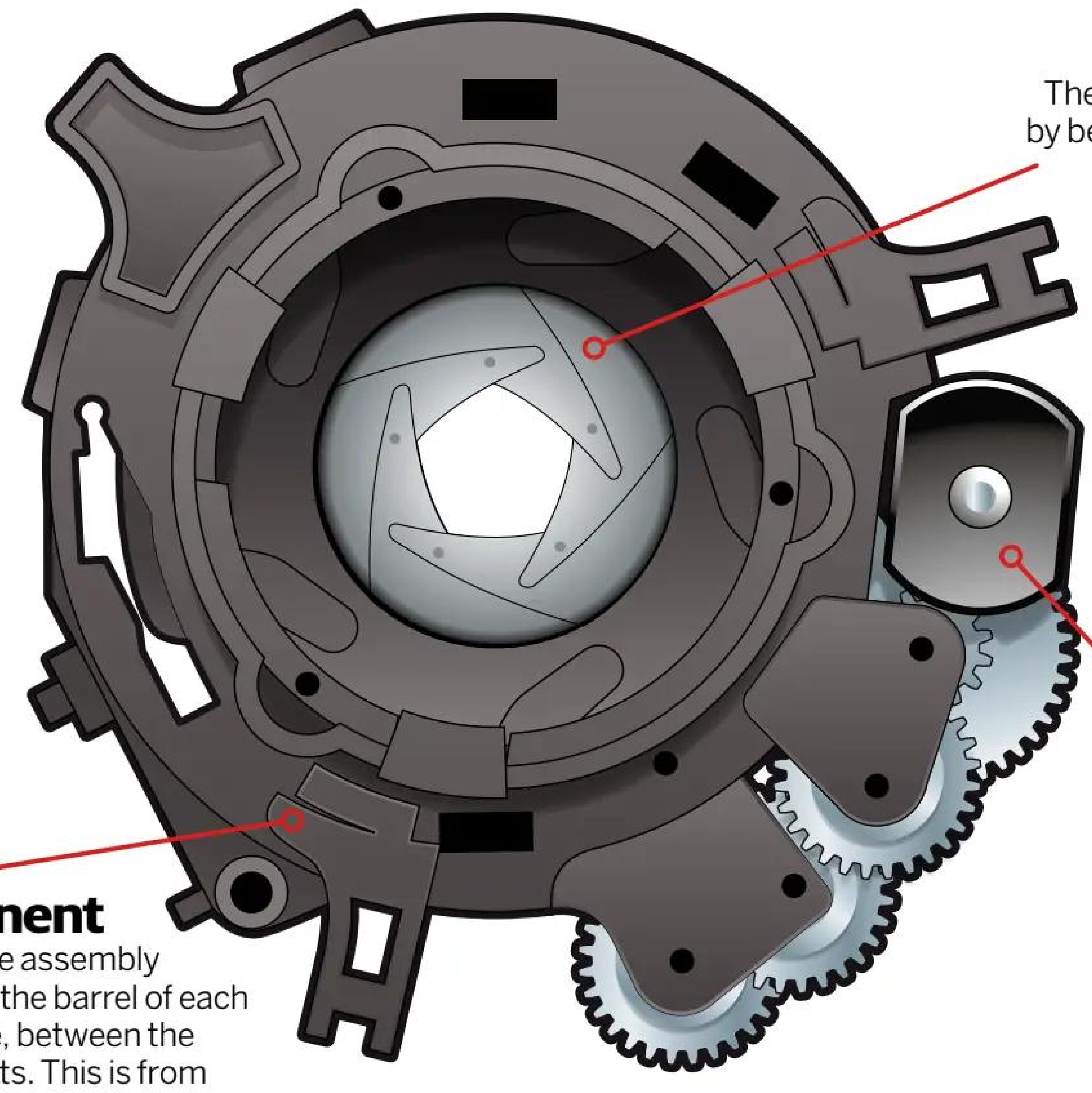
Stops making sense

The next mystery is to how the number sequence works; why does the traditional 'full stop' scale jump from f/2.8 to f/4, then from f/5.6 to f/8, rather than more evenly? Each time you close the aperture for a full stop, you let in half as much light. This makes it equivalent, in exposure terms, to halving the shutter speed. (NB: EOS cameras measures the aperture along either a half-stop or third-stop scale – you get choose which you use.)

The reason the scale jumps in this fashion is that the amount of light let in by the aperture is dependent on the *area* of the opening, not its *diameter.* It is the square of the f/number that counts: 2.8 squared is about 8; 4 squared is 16; 5.6 squared is about 32; and 8 squared in 64. With the f/numbers squared, 8, 16, 32, 64 makes a much more logical sequence.

Altering the f/number does not just alter the amount of light reaching the sensor. As we explored in the previous lesson, the aperture is one of the main factors

What the aperture looks like



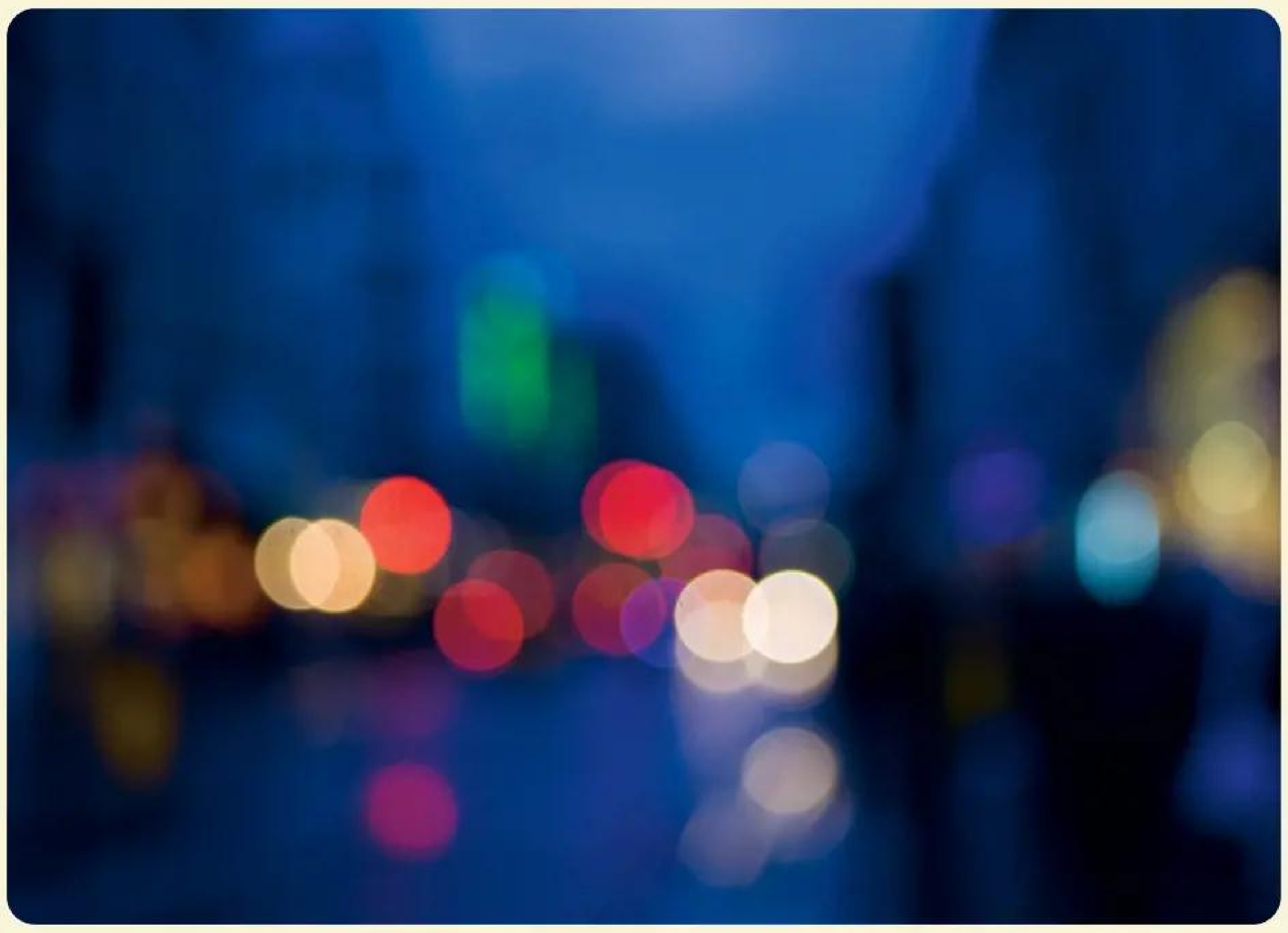
Iris blades
The aperture is created by between five and nine interleaved blades.

Motor
This opens and closes the aperture when the shutter fires, to match the f/stop set by you or the camera, and to match the focal length currently being used.

Lens component
The aperture assembly is located in the barrel of each lens you use, between the lens elements. This is from a Canon EF 50mm f/1.8.

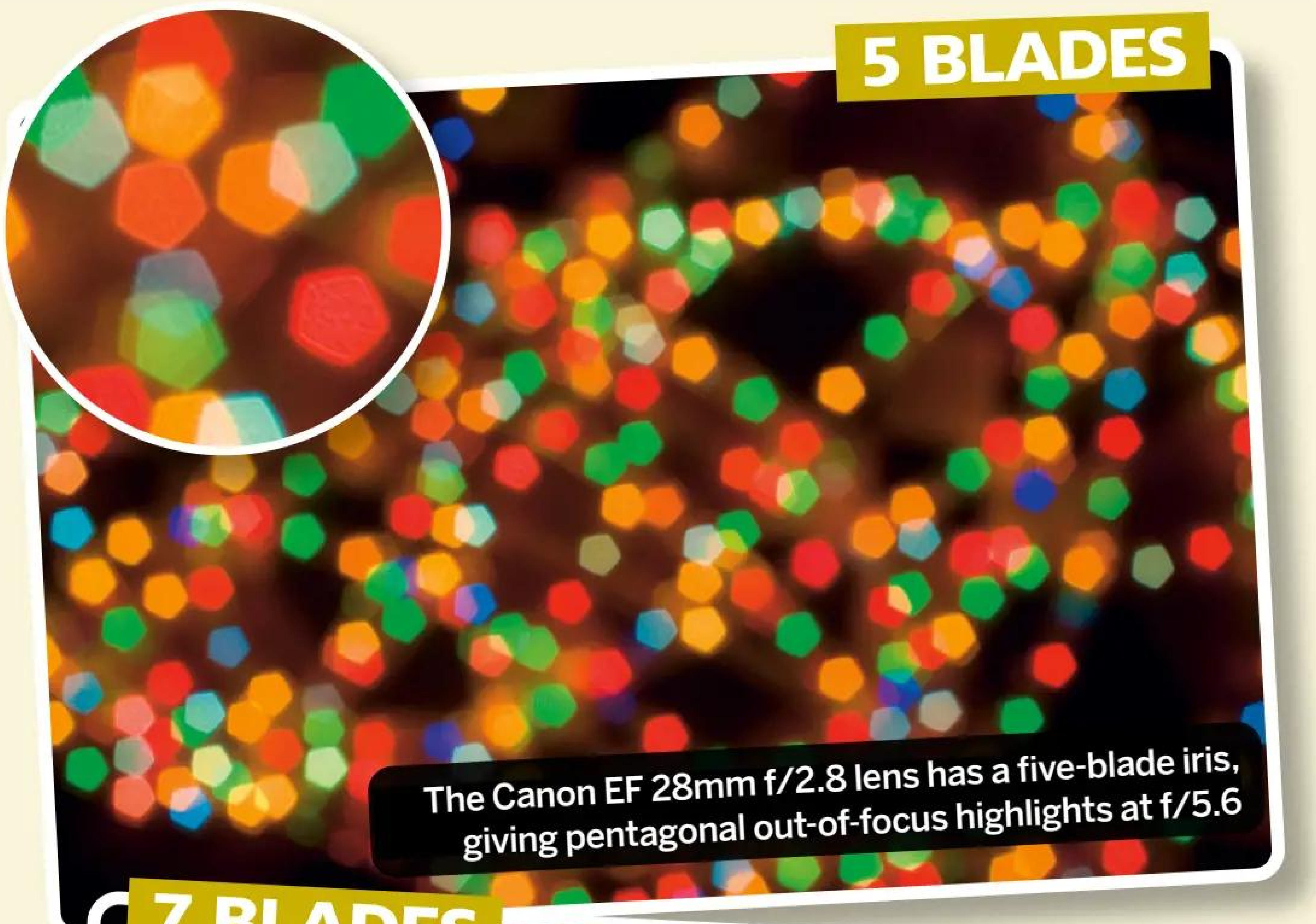
How many blades?

The diaphragm that creates the aperture is made up of a number of blades – and some lenses use more blades than others. The number of blades plays an important part in the smoothness of out-of-focus areas – a quality that is known by photographers as 'bokeh'. This effect can actually be seen clearly when photographing subjects with bright highlights in the background – such as city lights at night. Out-of-focus highlights will appear perfectly circular when using the maximum aperture of a lens. But at mid apertures, the highlights will take on the shape of the aperture opening – so will be pentagonal with five-bladed apertures, hexagonal with six-bladed apertures, and so on. At the smallest apertures, out-of-focus highlights become stars – with the number of points equalling the number of diaphragm blades.



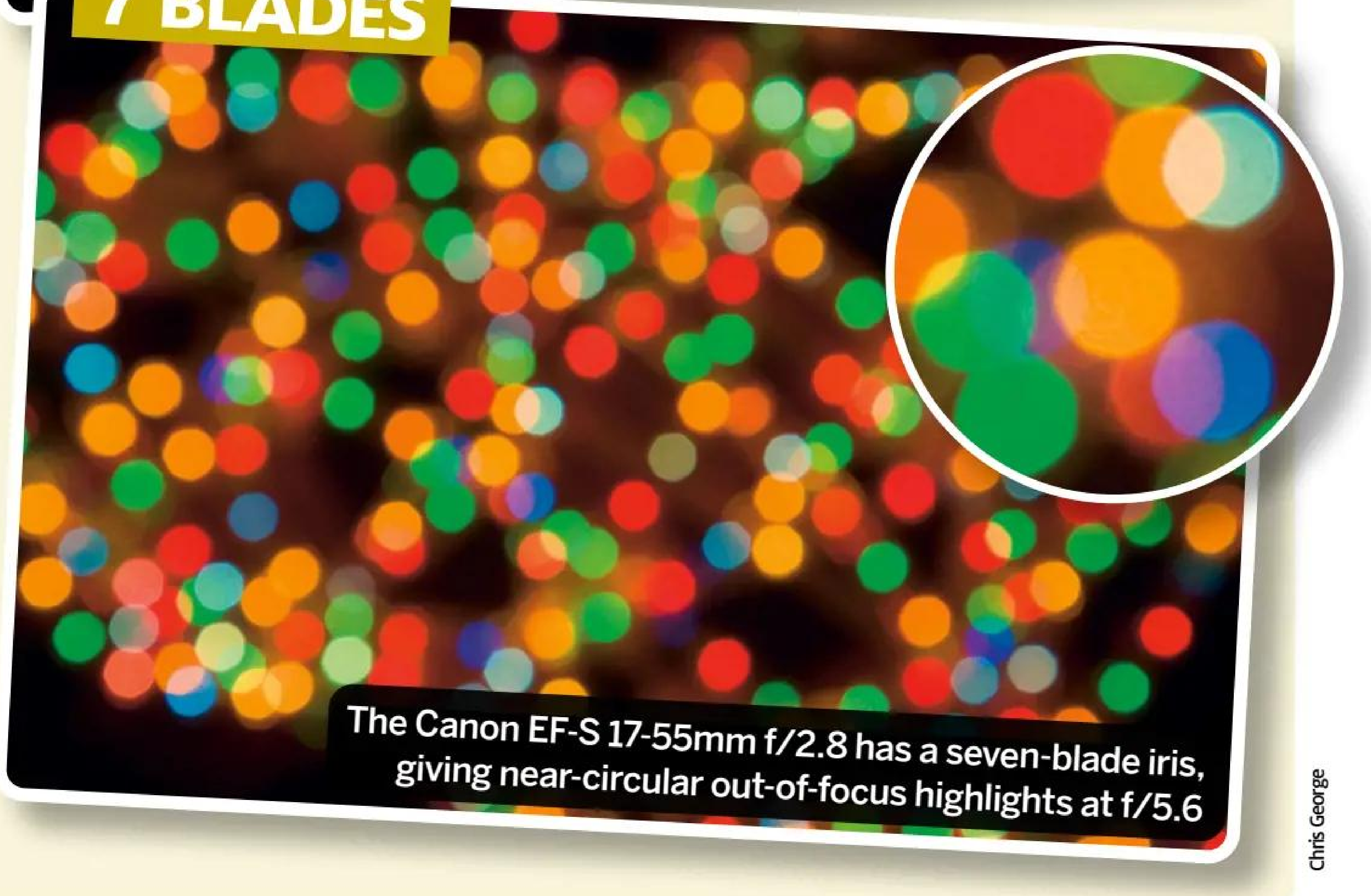
Shot at a lens's maximum aperture, out-of-focus highlights appear as circles in your picture

5 BLADES



The Canon EF 28mm f/2.8 lens has a five-blade iris, giving pentagonal out-of-focus highlights at f/5.6

7 BLADES



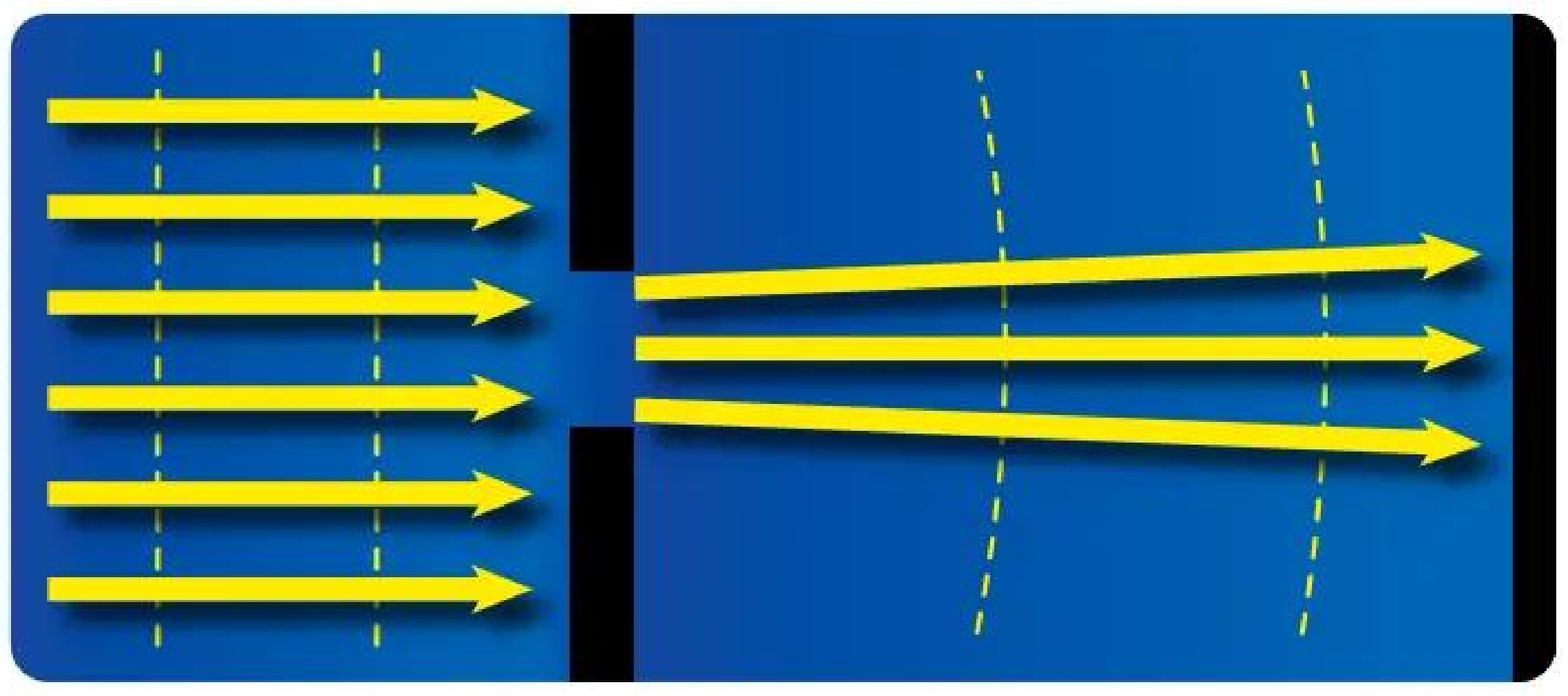
The Canon EF-S 17-55mm f/2.8 has a seven-blade iris, giving near-circular out-of-focus highlights at f/5.6

Chris George

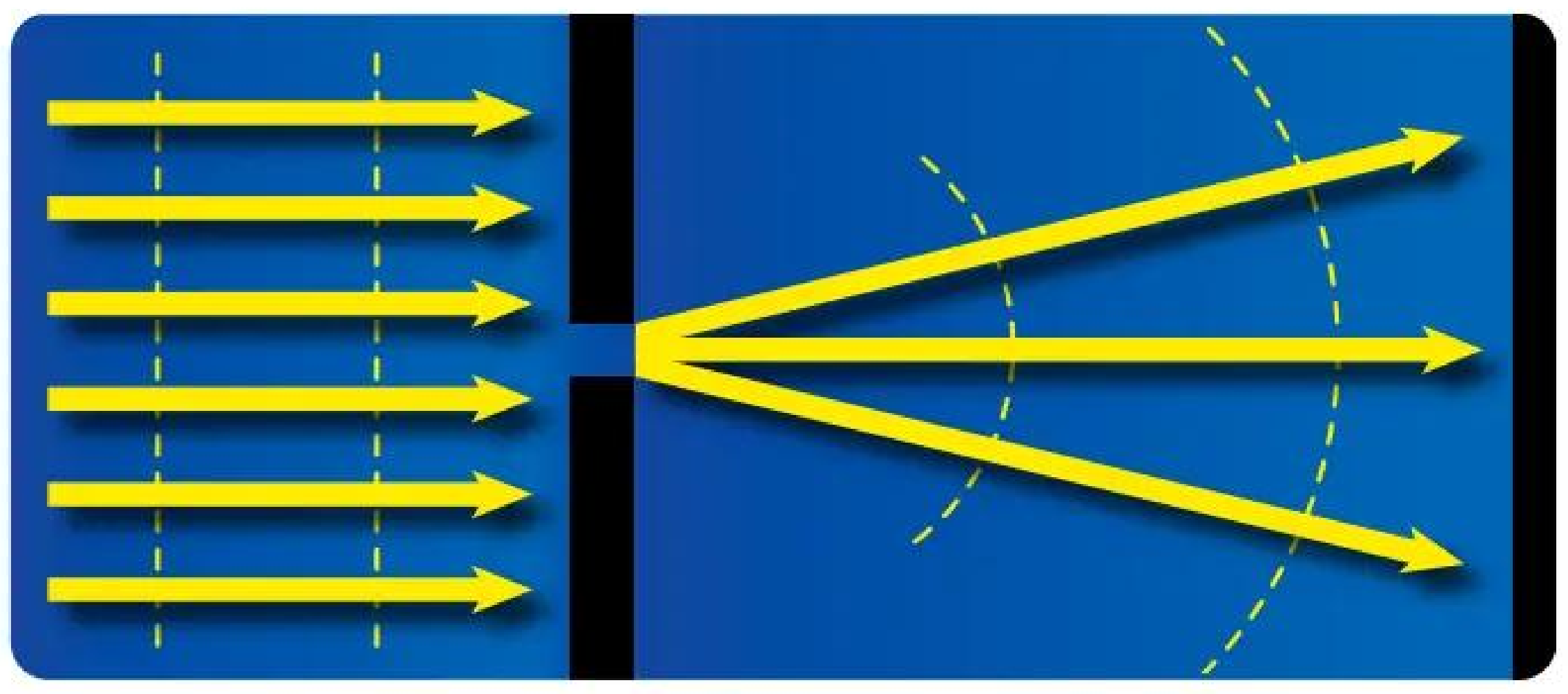
affecting the depth of field, and how much of the scene actually appears sharp. The aperture that you choose for a particular shot will therefore depend on which parts of the scene (if any) you are prepared to appear out of focus – and on the shutter speed you need to use (the faster the shutter speed needed, the wider the aperture will need to be, if you are going to leave the ISO unchanged). However, there is another factor that you need to take into account when choosing your aperture: a lens will perform better at some f/numbers than others, and it won't give its best resolution when set at its maximum aperture. Resolution and image quality will improve gradually as the aperture is made smaller – but only up to a certain point. As the aperture gets even smaller, the resolution and contrast of the image deteriorates again – due to an optical phenomenon known as diffraction (see box, right). ■

What is diffraction?

Light is like a wave, and when it hits a hard edge its path is bent – creating diffraction. The hard edges of the aperture cause diffraction – but this gradually increases as the aperture becomes smaller. At the smallest apertures, the 'eddies' created by the aperture blades create a fuzzy image on the DSLR's sensor.



Wide aperture: edges cause minimal bending



Narrow aperture: significant bending of light

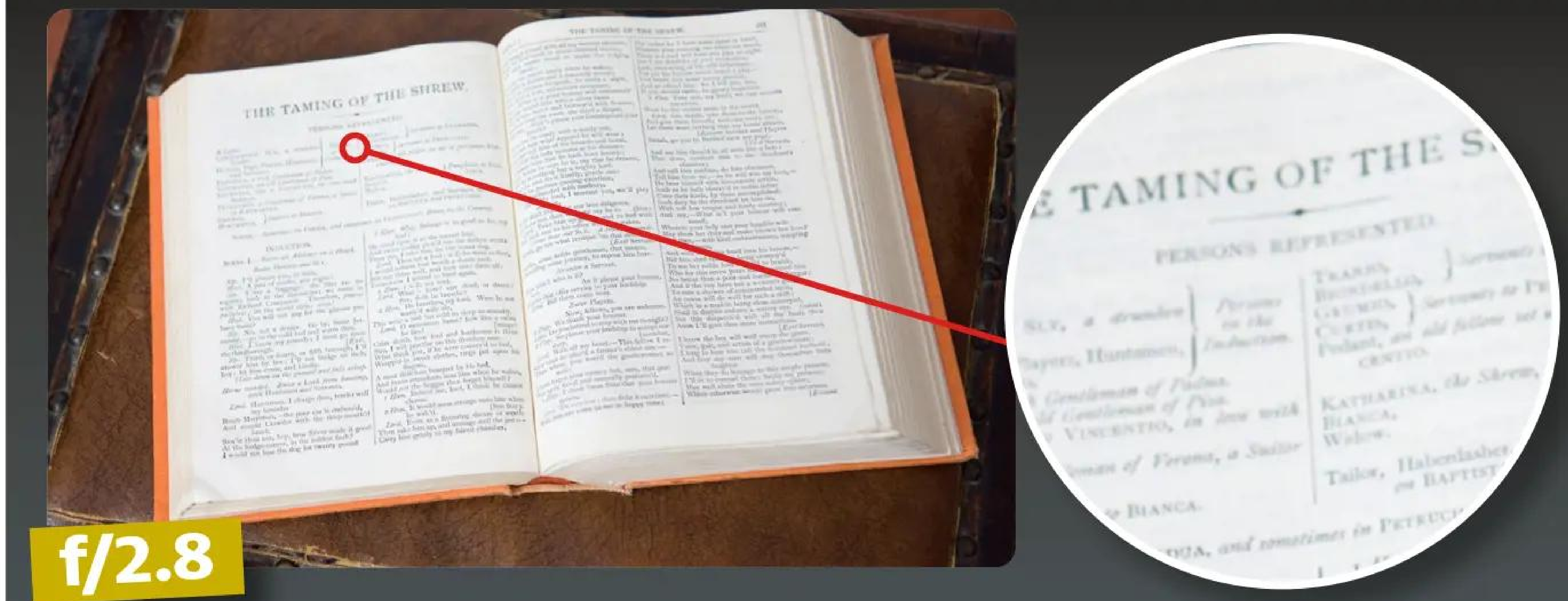
YOUR ASSIGNMENT! Give your lens a test

Often you will choose a particular aperture to ensure you can use a particular shutter speed – to give you the depth of field that you need. However, there are plenty of subjects where depth of field is not an issue (when photographing a flat surface from face on, for instance). Similarly, with stationary subjects, and when using a tripod, a wide range of shutter speeds can be used. In these situations, therefore, it pays to use the aperture that gives you the best results. But the exact aperture will vary depending on the lens. This lesson's homework is to work out which is the optimum aperture for each lens that you own.

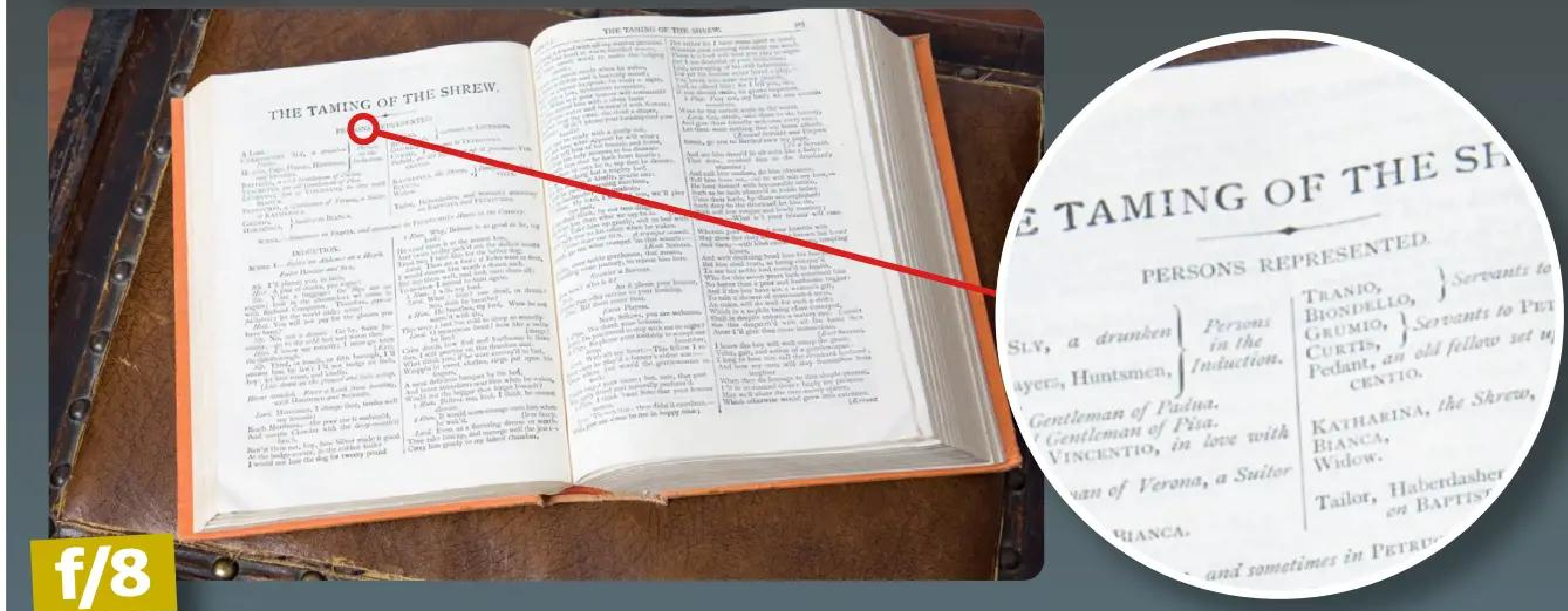
1 **Find a piece of paper with fine printed type. The financial pages from a newspaper will do (here we have used the works of Shakespeare). Set up your camera so you can photograph the page as straight on as possible – ideally you should use a tripod for this exercise.**

2 **Frame up the page so it fills most or all of the viewfinder. Set your EOS to its Av mode, and set the aperture to its widest setting. Focus and take a picture. Take identical pictures at all the full-aperture values available. Repeat the exercise for all the lenses you own.**

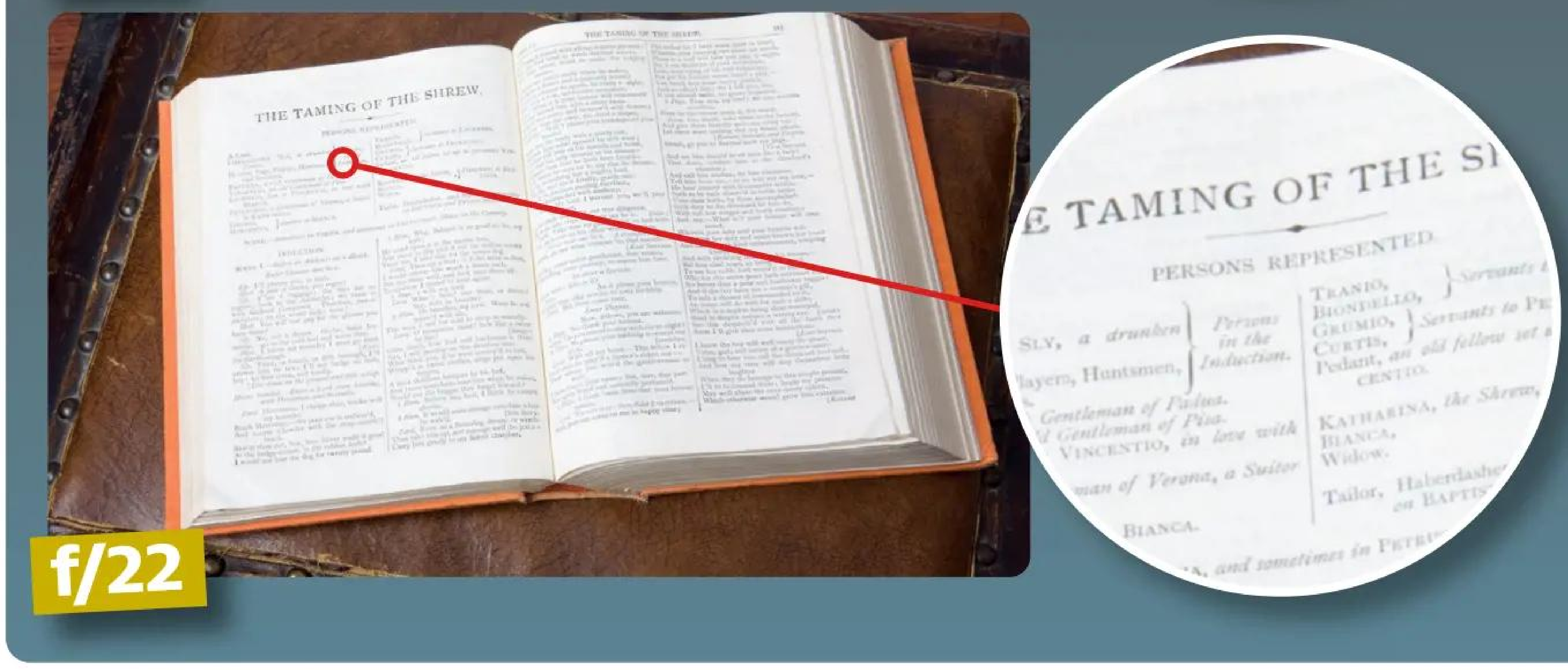
3 **Load your test images onto your computer and view them at high magnification. There should be a noticeable gain in resolution and contrast as you close the aperture down from maximum, and then a drop in resolution and contrast towards the smallest apertures. Make a note, for future reference, of the aperture that gives the best results with your lens or lenses.**



f/2.8



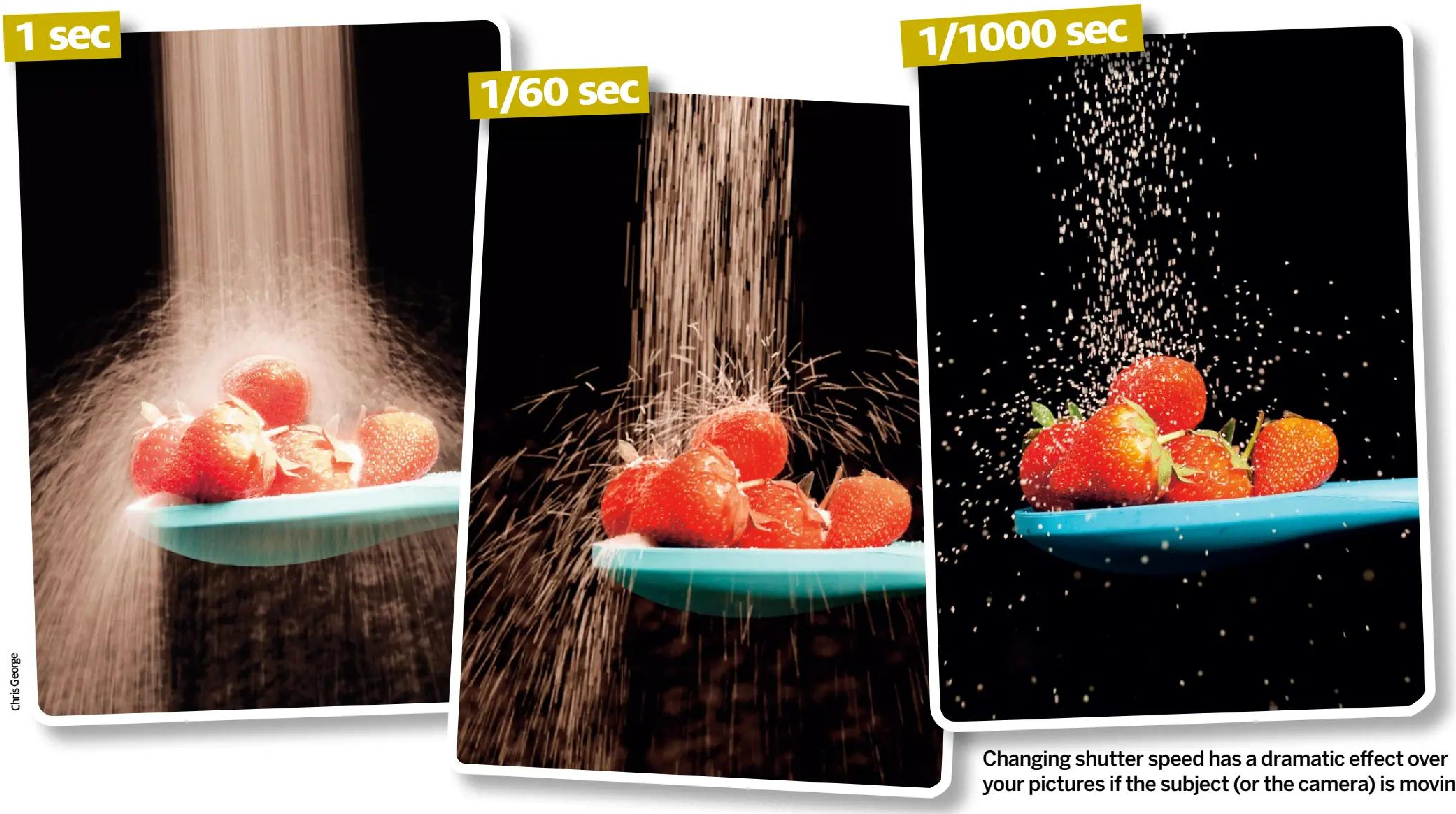
f/8



f/22

LESSON 5

What is shutter speed all about?


1 sec

1/60 sec

1/1000 sec

Chris George

Changing shutter speed has a dramatic effect over your pictures if the subject (or the camera) is moving

The shutter speed is one of two fundamental controls for regulating the brightness of your pictures. The shutter speed setting works in tandem with the aperture to ensure that you can get a perfect exposure in a huge variety of lighting conditions.

Shutter speeds are easier to understand than apertures – as the scale used is far more straightforward. The speed – the duration for which the shutter is open – is measured in fractions of a second. A 1/1000 sec shutter speed lets through half as much light (all other things being the same) as a 1/500 sec setting.

The shutter speed range is much more extensive than that afforded by the aperture range on even the most expensive lenses. The top speed on a digital EOS is either 1/4000 sec or 1/8000 sec, depending on the particular EOS model that you own. The longest automatically set shutter speed is 30 seconds – allowing 17 or 18 more stops of light to reach the sensor (up to 250,000 times more light). Use the Bulb setting and the shutter will remain open for as long as you keep the shutter release pressed, so can be stretched to whole minutes – or even hours.

Precision engineering

The shutter speed is controlled using the shutter, a precision-engineered mechanical device found just in front of the image sensor in your DSLR. The skill of its design lies in being to regulate the shutter opening precisely – particularly at the fastest shutter speeds. The stresses of this high-speed firing and re-arming procedure mean that Canon's top-end models are normally launched with an indication of how long the shutter will last until it needs to be replaced. Current pro-level 1D models are good for 300,000 cycles, while the 5D Mk II's shutter is said to last for 150,000 firings, compared to 100,000 on the 50D. Entry-level models are not given a figure, but are understood to be good for 50,000 shots. Programs are available to check the on-board counter of your SLR to see how many times your shutter has been fired (try EOSinfo, free from http://astrojargon.net/EOSInfo.aspx).

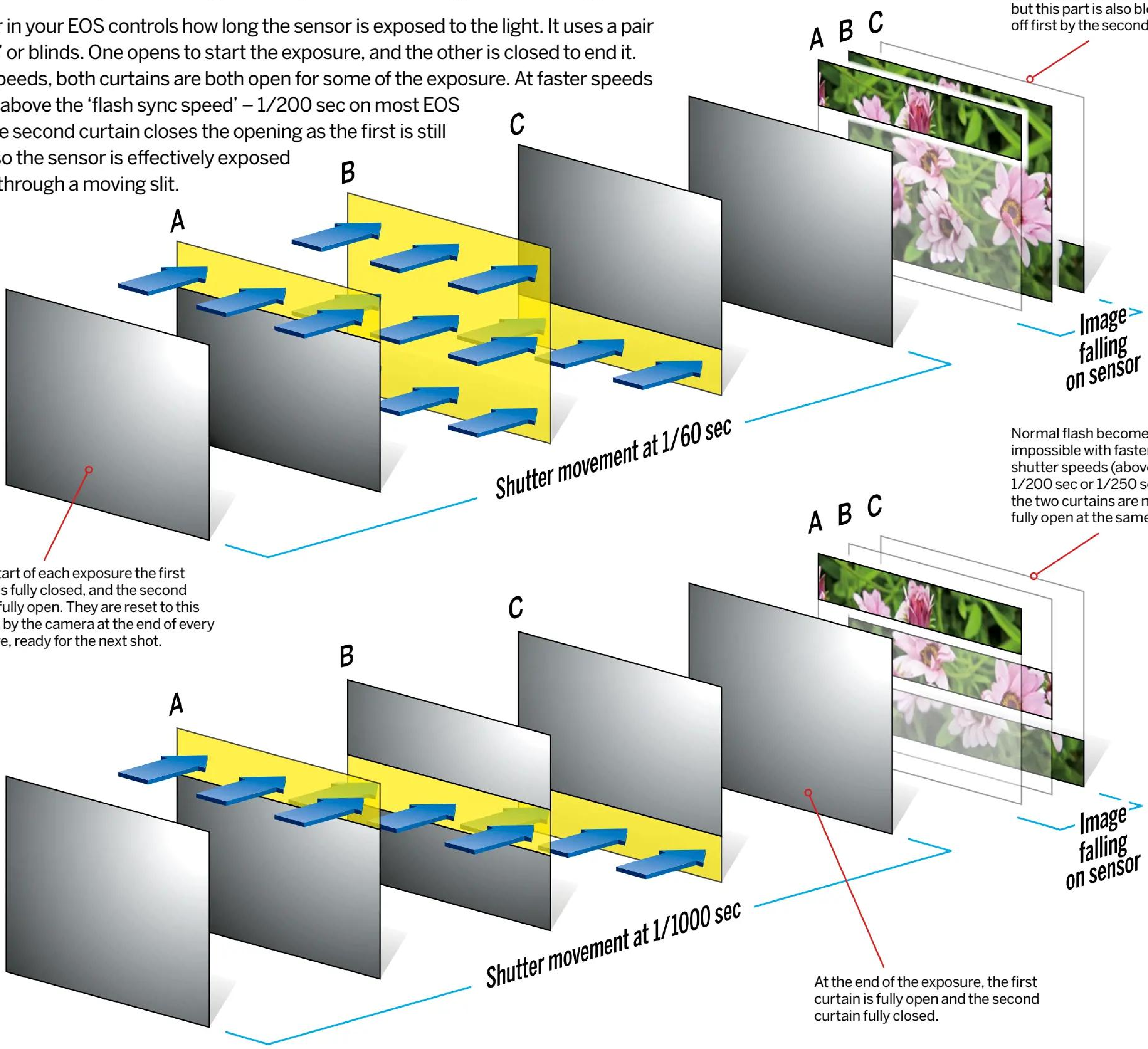
Allowing for movement

Like the aperture, the shutter speed is not just a way of adjusting the overall exposure of an image. It also has artistic uses, controlling the amount of blur (or lack of it) in a picture. This effect is only noticeable if either the camera or the subject is moving. Even with stationary subjects, shutter speed is crucial if the camera is handheld – the slightest movement of your body results in

How the curtains fall...

At faster speeds, the image is exposed through a moving slit

The shutter in your EOS controls how long the sensor is exposed to the light. It uses a pair of 'curtains' or blinds. One opens to start the exposure, and the other is closed to end it. At slower speeds, both curtains are both open for some of the exposure. At faster speeds (any speed above the 'flash sync speed' – 1/200 sec on most EOS models), the second curtain closes the opening as the first is still opening – so the sensor is effectively exposed to the light through a moving slit.


A
B
C
A B C
Image falling on sensor
Shutter movement at 1/60 sec
A
B
C
A B C
Image falling on sensor
Shutter movement at 1/1000 sec

The twin-blind arrangement ensures that the whole image area gets the same amount of light. The top of the scene is exposed to the sensor first, but this part is also blocked off first by the second curtain.

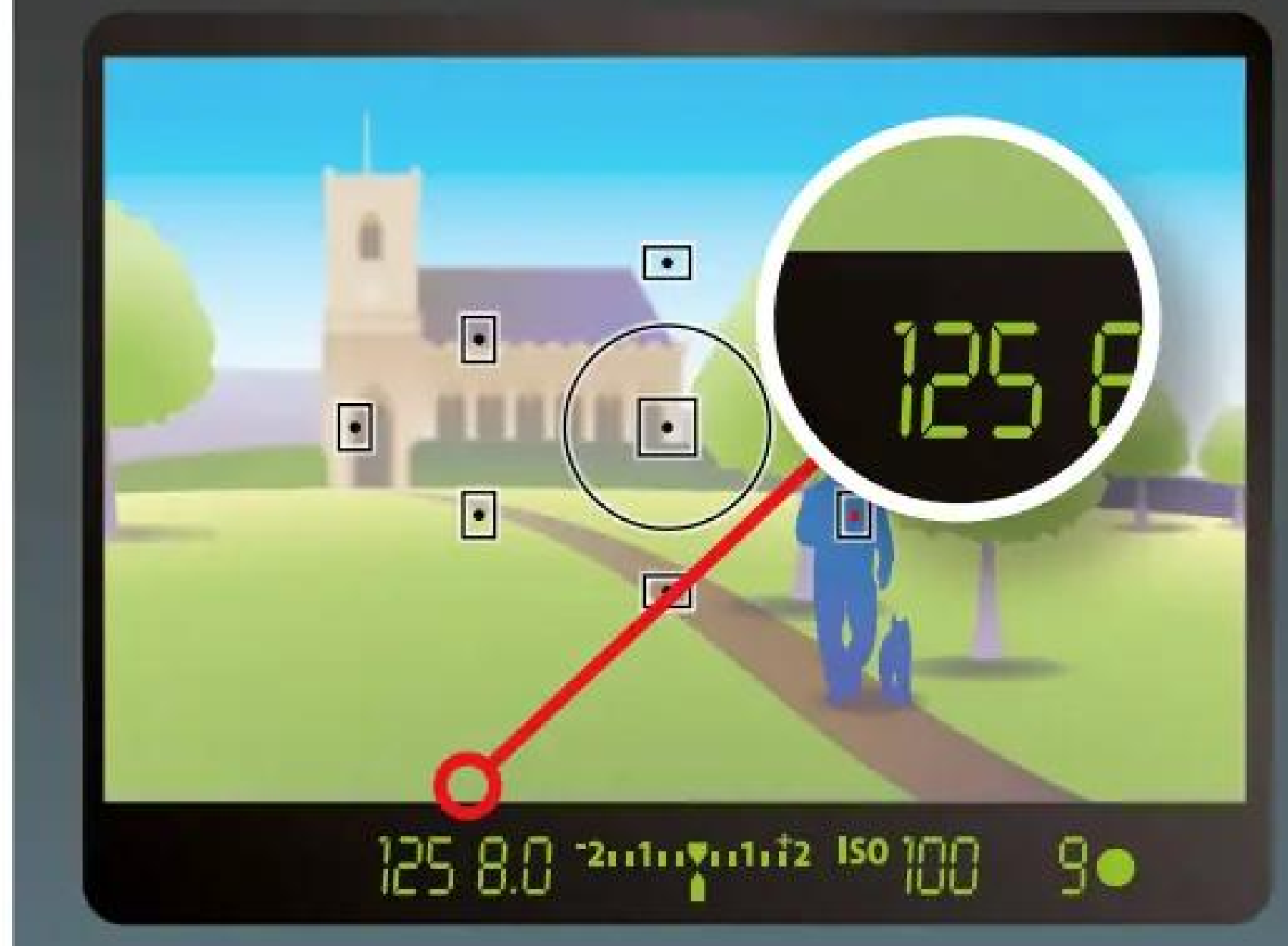
At the start of each exposure the first curtain is fully closed, and the second curtain fully open. They are reset to this position by the camera at the end of every exposure, ready for the next shot.

Normal flash becomes impossible with faster shutter speeds (above 1/200 sec or 1/250 sec), as the two curtains are never fully open at the same time.

At the end of the exposure, the first curtain is fully open and the second curtain fully closed.

Illustration: Andy McLaughlin

STEP BY STEP How to check and set your speed


125 F
125 8.0 ISO 100 9

1 The best place to see the shutter speed you are using is in the viewfinder. Half-press the shutter button; the shutter speed is the first number at the bottom.

Canon
1/25
1/25 F5.6
ISO 1600
AWB
Av
MF
(1746)

2 For an alternative view, many Canon DSLRs will also show you the shutter speed you are using on the rear LCD. Again, half-press the trigger to fire up the metering.

200
WB AF-DRIVE ISO
200 5.0 246
ONE SHOT
ISO 1600

3 Top-end DSLRs, like the 40D and 5D, have a top-plate LCD screen, which gives you an easy-to-see readout of your exposure settings, including speed.

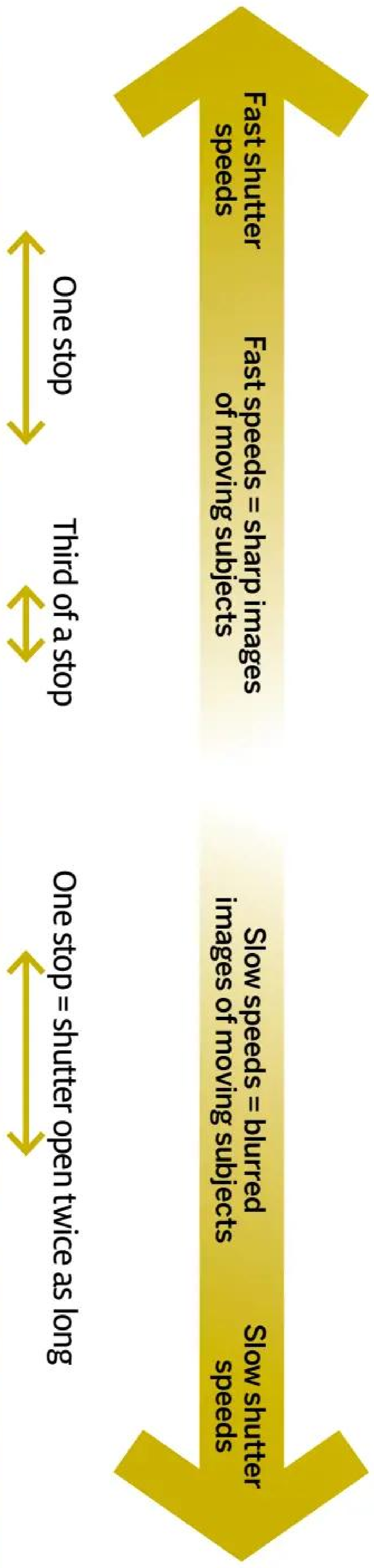
M
Av
Tv
P
A-DEP
ON
OFF

4 The easy way to control the shutter speed yourself is to switch to Av, Tv or P mode – then turn the wheel by the trigger until you get the value that you want in the viewfinder.

Making sense of the speed scale

Canon SLRs give you the choice of two different shutter speed scales – one with half-stop steps, the other with third-stop steps (see Step by Step, below). Each step along the full stop scale represents a doubling (or halving) of the amount of light reaching the sensor.

Full stops	1/2 stops	1/3rd stops
1/4000	1/4000	1/4000
		1/3200
	1/3000	
		1/2500
1/2000	1/2000	1/2000
		1/1500
	1/1500	
		1/1250
1/1000	1/1000	1/1000
		1/800
	1/750	
		1/640
1/500	1/500	1/500
		1/400
	1/350	
		1/320
1/250	1/250	1/250
		1/200
	1/180	
		1/180
1/125	1/125	1/125
		1/100
	1/90	
		1/80
1/60	1/60	1/60
		1/50
	1/45	
		1/40
1/30	1/30	1/30
		1/25
	1/20	
		1/20
1/15	1/15	1/15


One stop
Third of a stop
One stop = shutter open twice as long
Fast shutter speeds
Fast speeds = sharp images of moving subjects
Slow speeds = blurred images of moving subjects
Slow shutter speeds

Electronic shutters

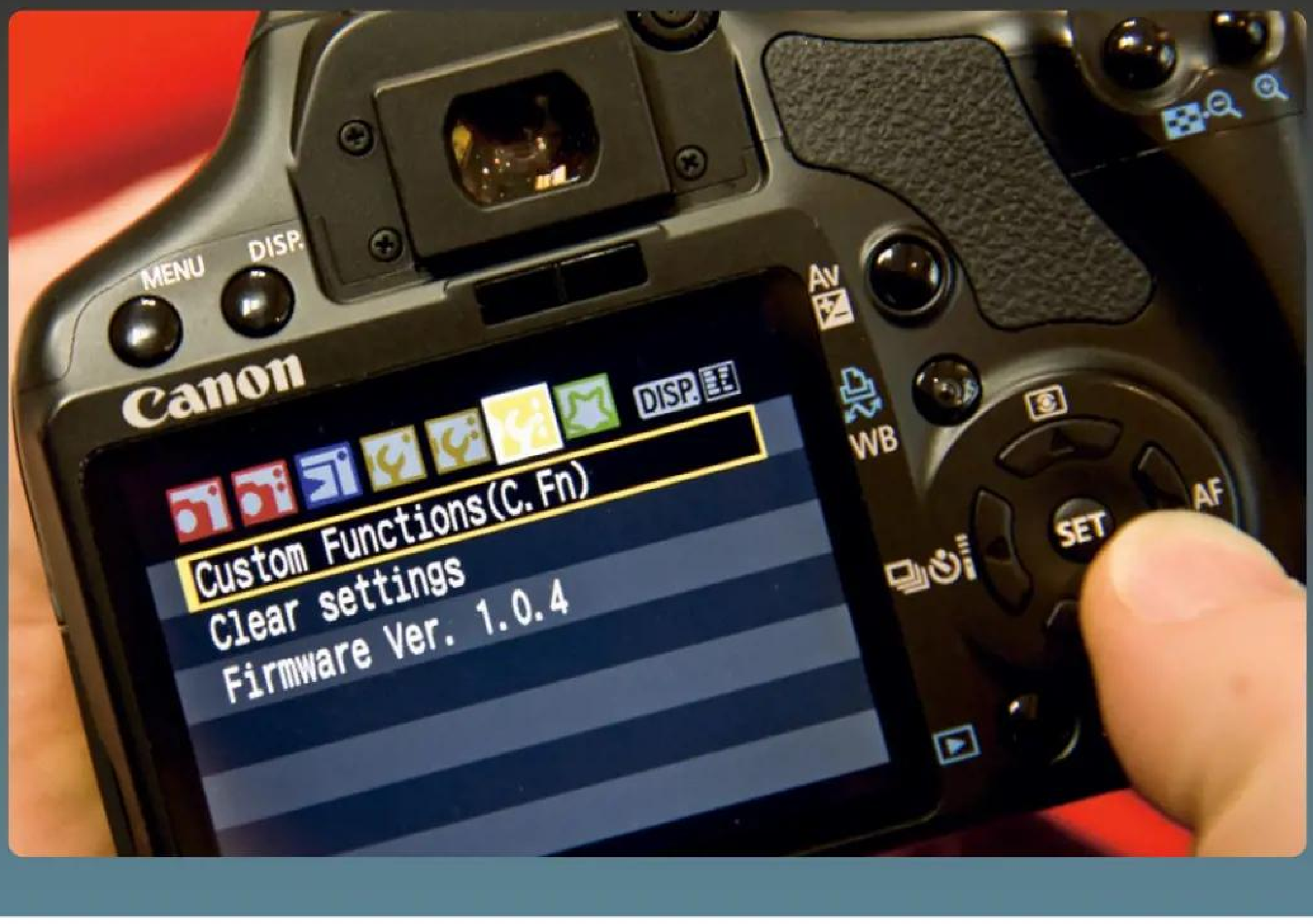
The original EOS-1D, launched in 2001, had an electronic shutter, where the shutter speed was controlled by the CCD sensor itself. This meant it had a record-breaking 1/16,000 sec top shutter speed, and a massive 1/500 sec flash sync speed. Canon moved over to using its own CMOS sensors after this, which made the use of a mechanical shutter to control the exposure essential – but gave countless other advantages that meant the drop in top speed was well worth accepting.

'camera shake' and a blurred image. If the shutter speed is fast enough, this movement becomes imperceptible. Just how fast the shutter needs to be to avoid camera shake depends on a number of factors (including whether you use an image-stabilised lens, and how windy it is). The most important factor is the focal length of lens. The more you zoom in (and the narrower the angle of view) the more this camera shake becomes noticeable. So the longer the focal length you use, the faster the shutter speed you need. A rough-and-ready rule is that your minimum shutter speed should be 'one over' the focal length. So with a 50mm lens setting use 1/50 sec or faster, and 1/200 sec or faster with a 200mm lens.

Use a solid tripod, though, and the camera shake problem is eliminated, giving you complete control of shutter speed – and therefore also a greater choice of aperture.

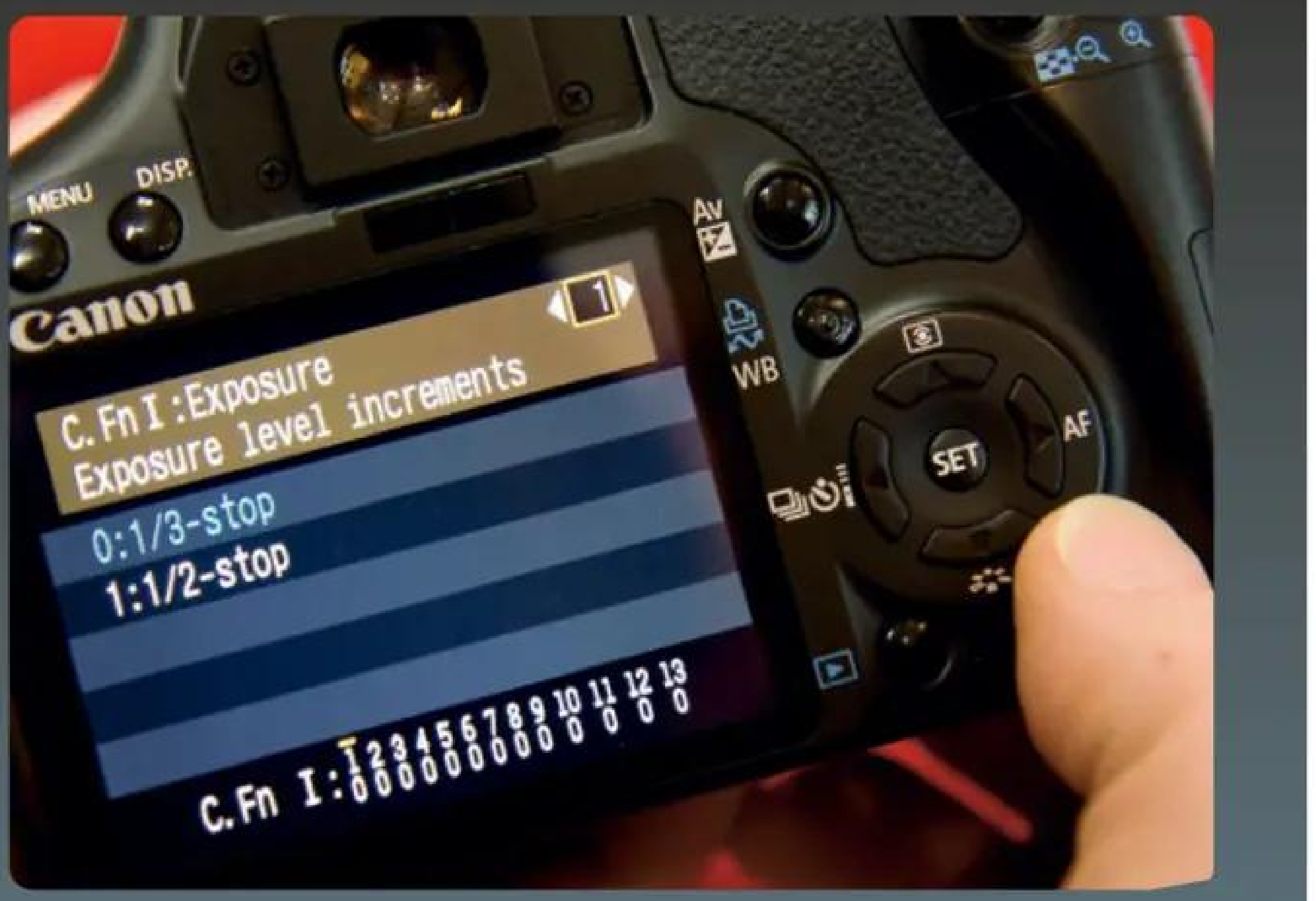
Moving subjects will also affect shutter speed choice. If you want the subject to appear sharp in the shot, a fast enough (short enough) speed

STEP BY STEP 1/2- or 1/3-stop steps?



Custom Functions(C.Fn)
Clear settings
Firmware Ver. 1.0.4

1 Your EOS gives a choice of two different shutter speed scales – with half-stop or third-stop steps. To switch, press the Menu button and scroll to the Custom Function options.



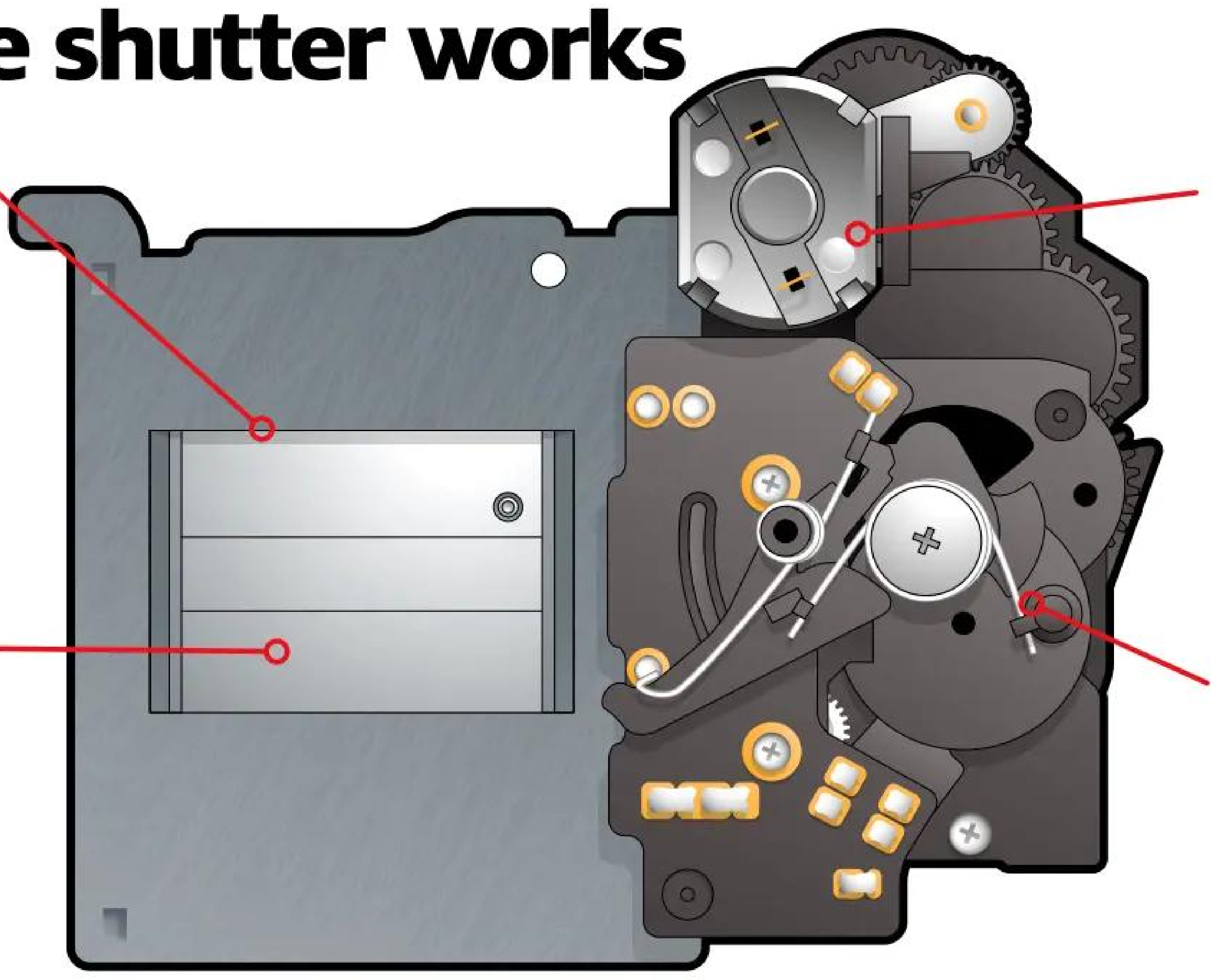
C.Fn I :Exposure
Exposure level increments
0:1/3-stop
1:1/2-stop
C.Fn I:1 2 3 4 5 6 7 8 9 10 11 12 13

2 The exact Custom Function number varies depending on the EOS model. The one you want is called Exposure Level Increments. Scroll to the one you want, and press Set; we recommend '1/2-stop'.

must be used to make the subject appear still. Choosing the exact speed depends not just on the speed of the subject, but also on how big it appears in the frame, and its direction. You need a faster shutter speed if the subject is moving directly across the field of vision, rather towards the camera – and a faster speed the bigger the subject appears in the picture.

However, it is not essential for everything to be completely still – many moving subjects are more artistically captured with a deliberately long shutter speed. The secret is to use a shutter speed that is long enough to make the blur look deliberate, rather than accidental. Using a tripod helps – so static parts of the scene appear sharp, and only moving parts appear artistically blurred. ■

How the shutter works



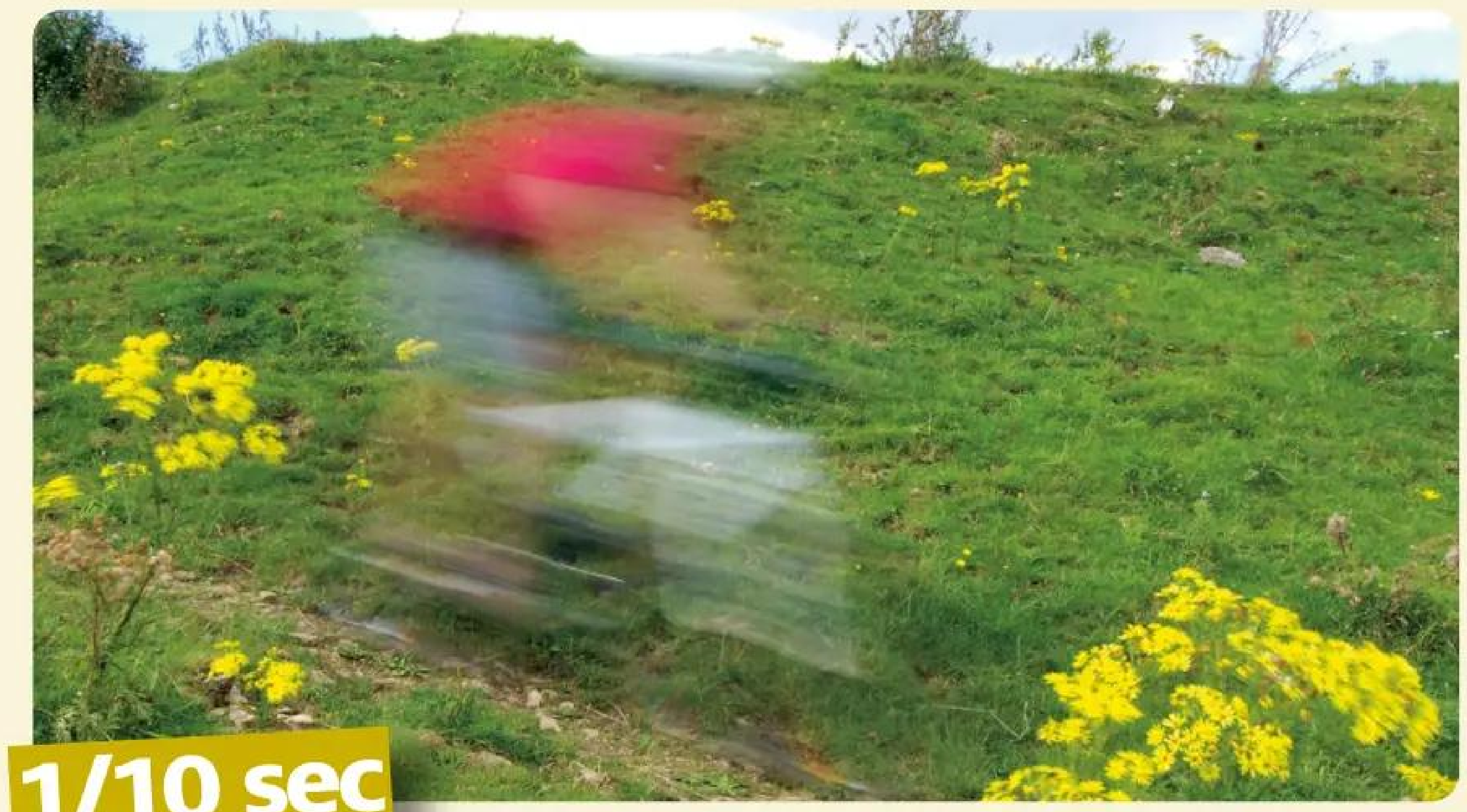
Focal plane
EOS SLRs use what is known as 'vertical-run focal plane' shutters – as the blinds run up and down, and are found just in front of the sensor.

Twin blinds
The shutter mechanism is made up of two gossamer-thin blinds. One drops open to start the exposure, the second follows to close the opening.

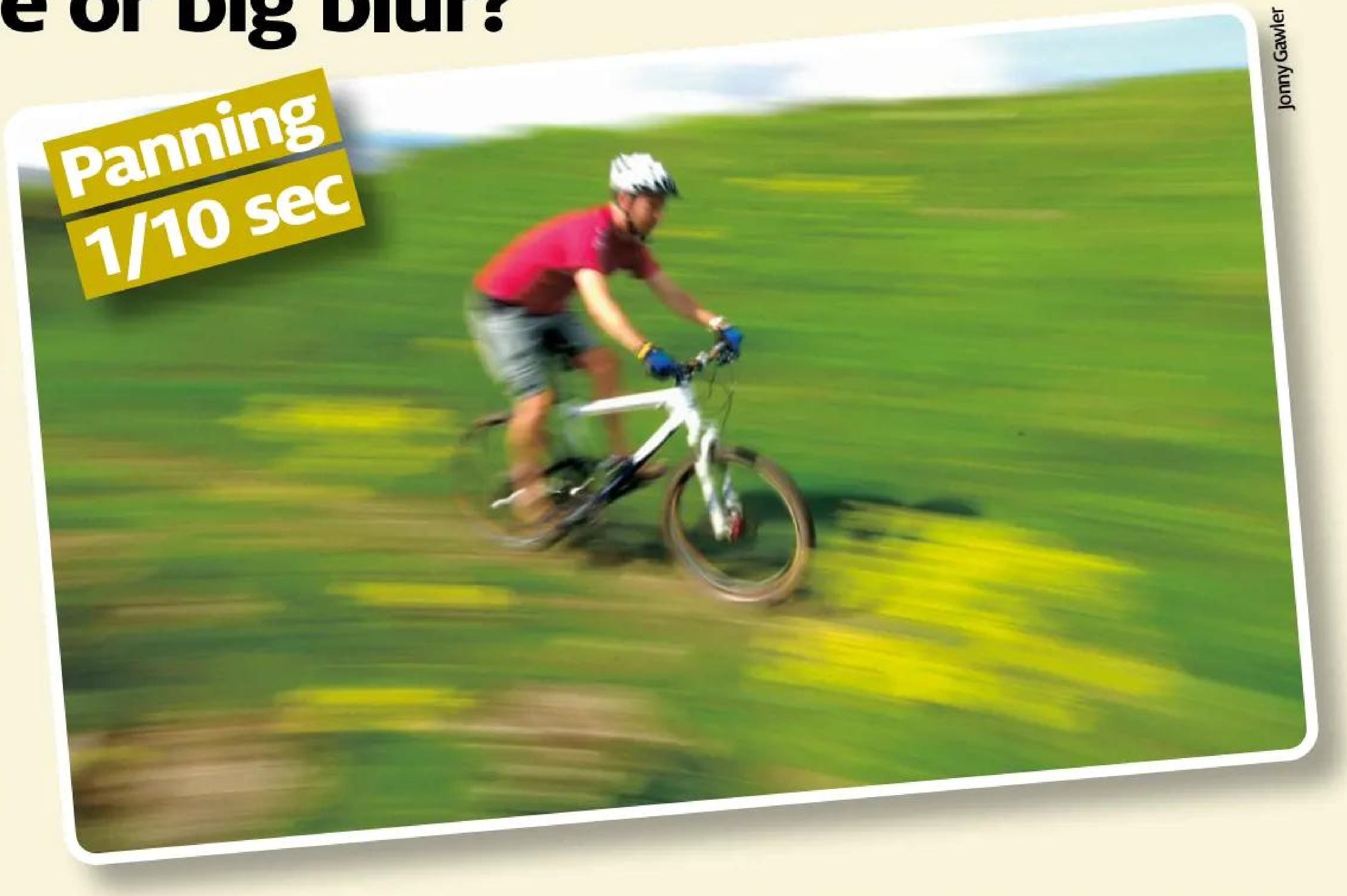
Motor
The shutter mechanism has its own motor, for firing and cocking the blinds. A separate motor is used for the mirror, which must be raised just before the shutter is fired.

Longevity
The shutter durability varies considerably from model to model. Current EOS-1D models are good for 300,000 cycles.

YOUR ASSIGNMENT! Big freeze or big blur?



1/10 sec



Panning 1/10 sec

Jonny Gawler

1/250 sec

1/1000 sec

Having the choice over whether to freeze moving subjects, or have them appear artistically blurred, is one of the great advantages of owning an SLR. For this homework, you'll need to find a fit volunteer to act as your moving target. The person will need to be able to run or cycle past you several times at similar speeds each time.

1 Set the camera's Exposure Mode dial to Tv, and set an ISO of 400. Put the camera on a tripod, if you have one. Set the Drive mode to continuous and the AF mode to AI Focus.

2 Using the wheel behind the shutter, set the shutter speed to 1/4000 sec (this may show as 4000 on the LCD display). If the aperture number flashes, you will need to increase the ISO. Get your volunteer to run or ride – and shoot a series of shots as they pass.

3 Repeat this several times using slower shutter speeds. Shooting at 1/1000, 1/250, 1/60, 1/15 and 1/4 sec will give a good range of effects.

4 Check your images closely on the computer for each shutter speed you have used. Which shutter speeds freeze the subject perfectly. Which give the best 'artistic' blur?

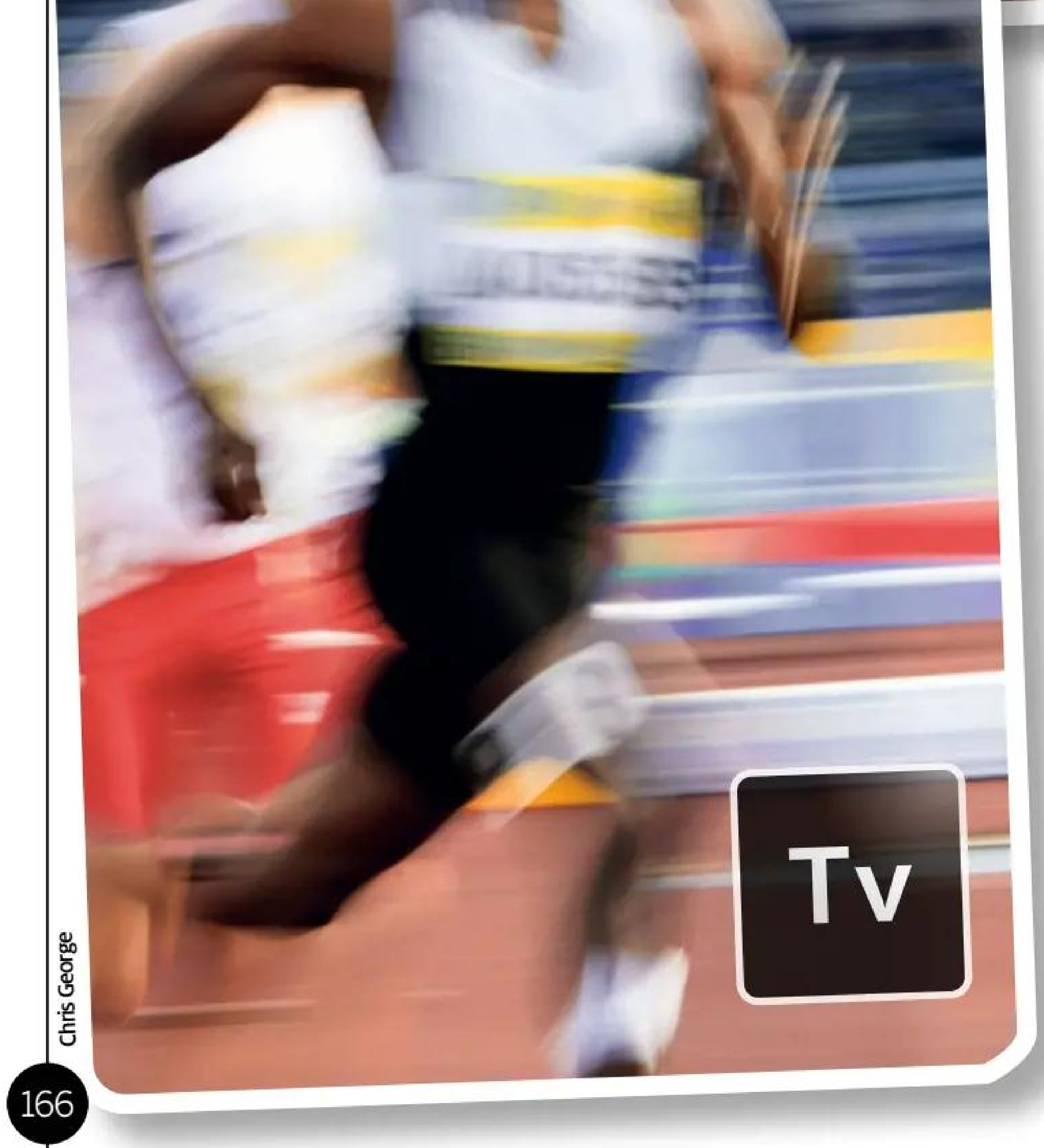
5 As an optional, advanced challenge, repeat the whole exercise – this time 'panning' your camera to track the movement of the subject as it crosses the frame. See what shutter speed gives the most pleasing 'speed blur' effect.

LESSON 6

Which mode should I use?

If you just want a fast speed, or the fastest speed, Aperture Priority (Av) is the best setting to use; for a specific speed, for creating blur, say, choose Shutter Priority (Tv)

Av
SCOTLAND
6
AVIVA
MCNULTY
BIRMINGHAM
3
AVIVA
WILKINSON
WESTBURY
8
CAREY
BIRMINGHAM
AVIVA



Chris George

The main dial on top of your SLR can have a dozen or more settings – and it is not always obvious what they all do. As we will discover, some of these 'exposure modes' are more useful than others.

In the last couple of lessons, we looked at the importance of shutter speed and aperture selection. We have explored how aperture can affect how much of the scene is in focus, and how shutter speed can be used to create super-sharp shots – or ones that are artistically blurred. Choose a particular shutter speed (or aperture) – and the aperture (or shutter speed) has to change as well, in order to get the overall exposure that you want. The exposure mode that you use dictates how the particular pairings of shutter speed and aperture are chosen.

The exposure mode options that you find on a typical Canon DSLR can be broken up into three different types. The traditional exposure modes are known as the 'Creative Zone' modes. The four main options are M, Av, Tv or P. Each allows you to specify exactly which shutter speed or aperture that you use – giving you full creative control.

Pretty pictures

The second group is the Basic Zone. These are fully automatic exposure modes that set the shutter speed and aperture for you – giving you no direct control on the settings that you are using. With names like Portrait and Sport (and with matching pretty pictograms) they give a one-size-fits-all solution to common shooting subjects. Unfortunately, they are not great

▶

Make sense of modes

An at-a-glance guide to all your big-dial options

The number of shooting modes that you have available will depend on the model of EOS SLR that you own. Some, such as 'CA', are only found on recent models, whilst the full-auto 'Basic Zone' options represented by pictograms are not found on high-end models like the EOS 5D or 7D. These are the 550D's options:

Full Auto
The idiot 'green square' mode – sets *all* the camera settings for you automatically.

Creative Auto
Only found on most recent EOS SLRs. Lets you tweak aperture and exposure compensation in a jargon-free way.

Metered manual
You set both aperture and shutter speed, but the camera still gives a meter reading.

Aperture priority
You set the aperture, and the camera then sets the shutter speed for you.

Shutter priority (time value)
You set the shutter speed, and the camera then sets the aperture for you.

Program shift
The camera pairs aperture and shutter speed, but you can tweak them – see below.

Movie mode
Only found on the mode dial of some newer EOS models that feature HD video recording.

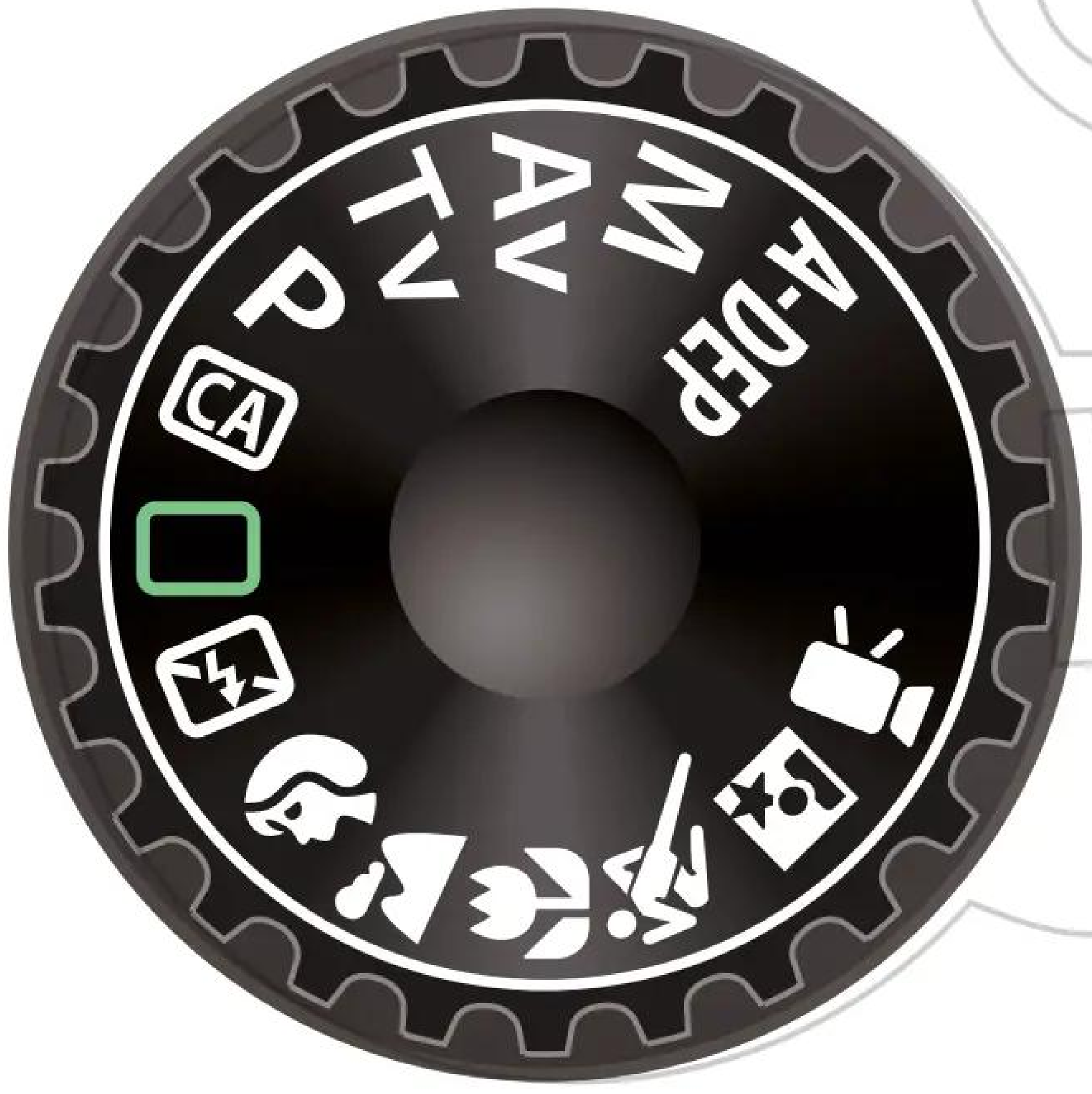
Portrait mode
Sets a wide aperture to blur backgrounds, but overrides other settings.

Landscape mode
Sets aperture to maximise depth of field, but overrides other settings.

Close-up mode
Sets a wide aperture to blur backgrounds, but overrides other settings.

Sports mode
Sets a fast shutter speed to freeze action, but controls other settings too.

Night portrait mode
Combines flash with a slow shutter speed, but fixes other settings.



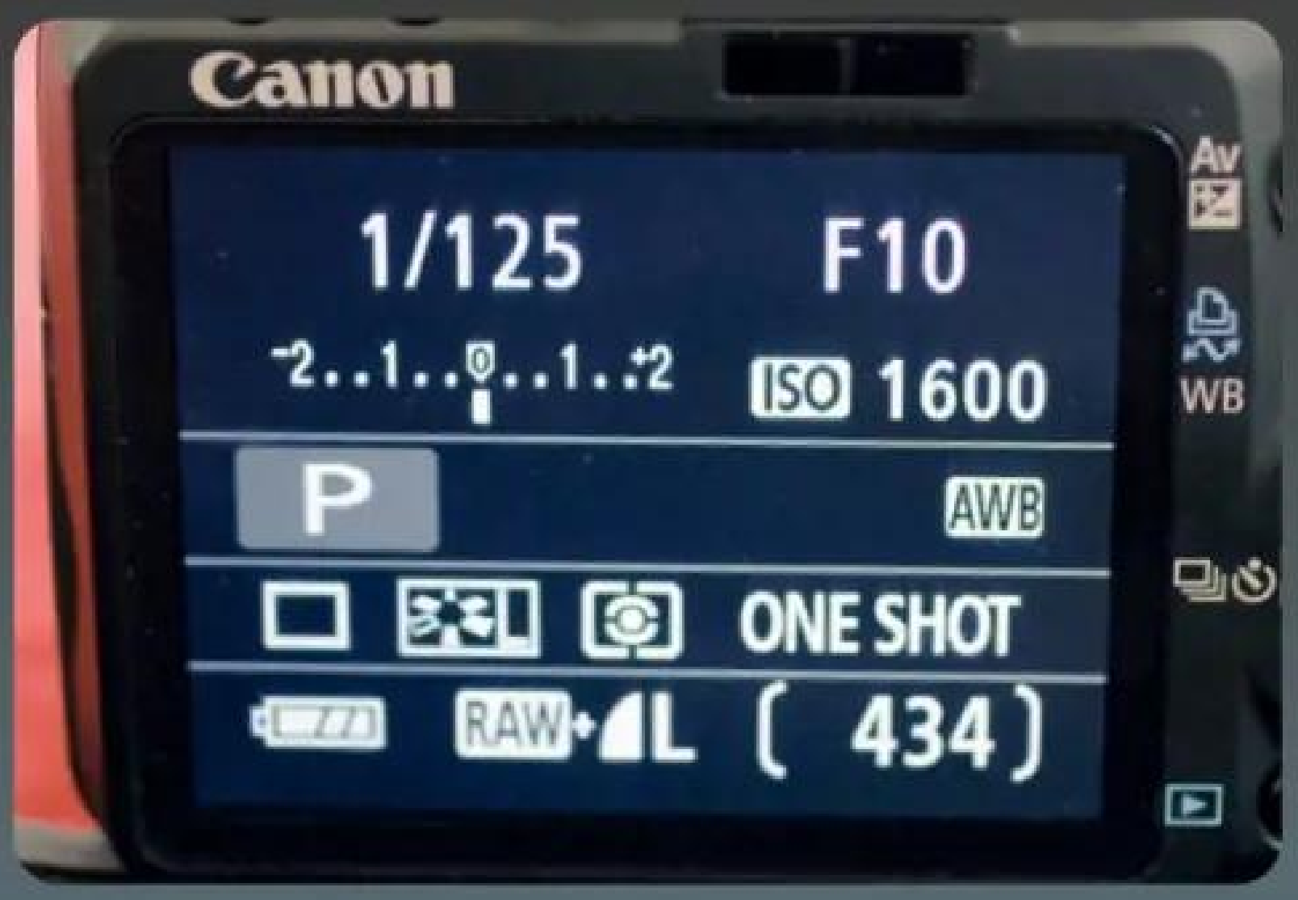
Flash off mode
Fully automatic mode that ensures flash does not fire.

Automatic depth of field
Tweaks aperture and focus to ensure key parts of picture are sharp.

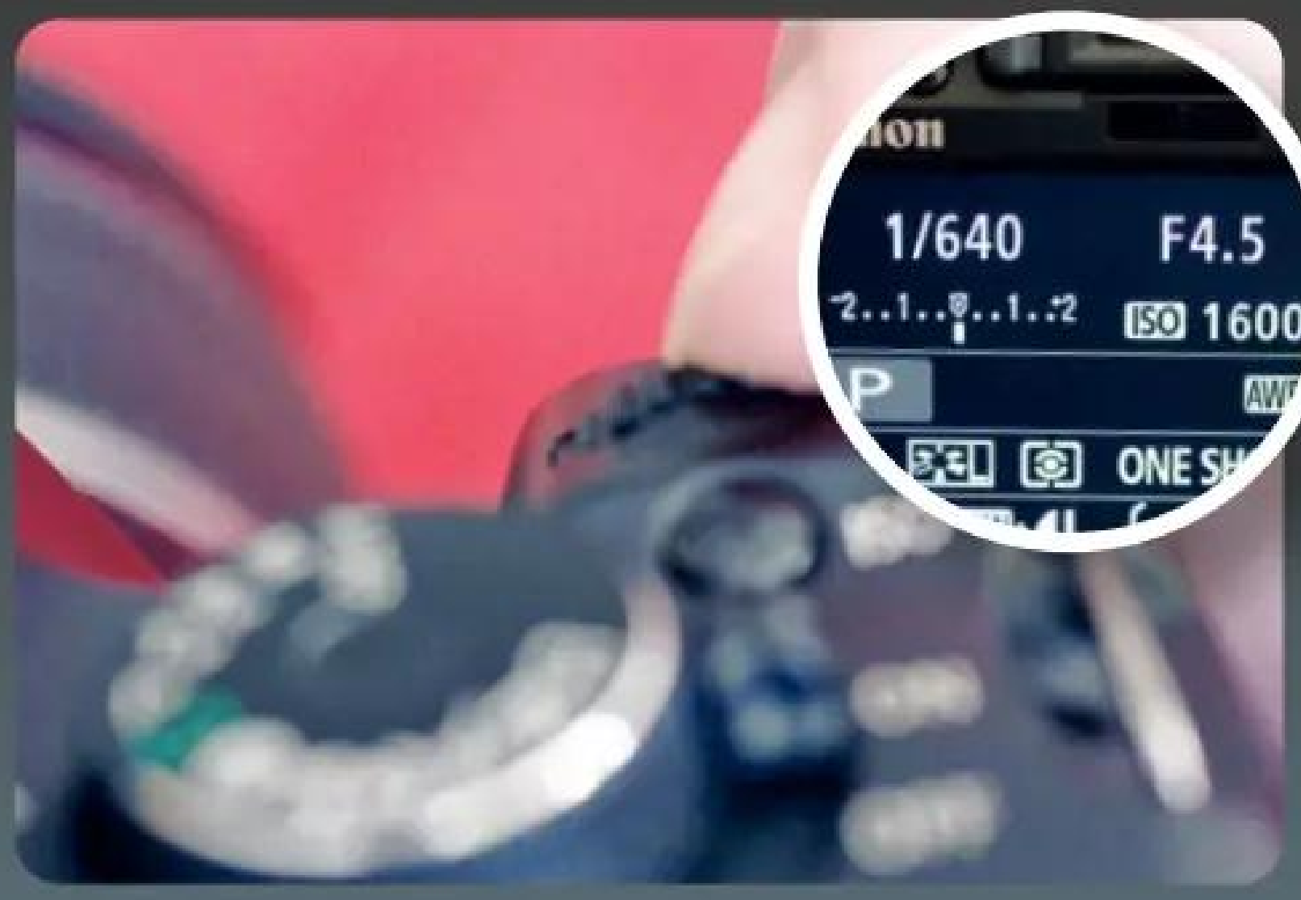
Illustrations: Andy McLaughlin

STEP BY STEP How to shift the settings in P mode

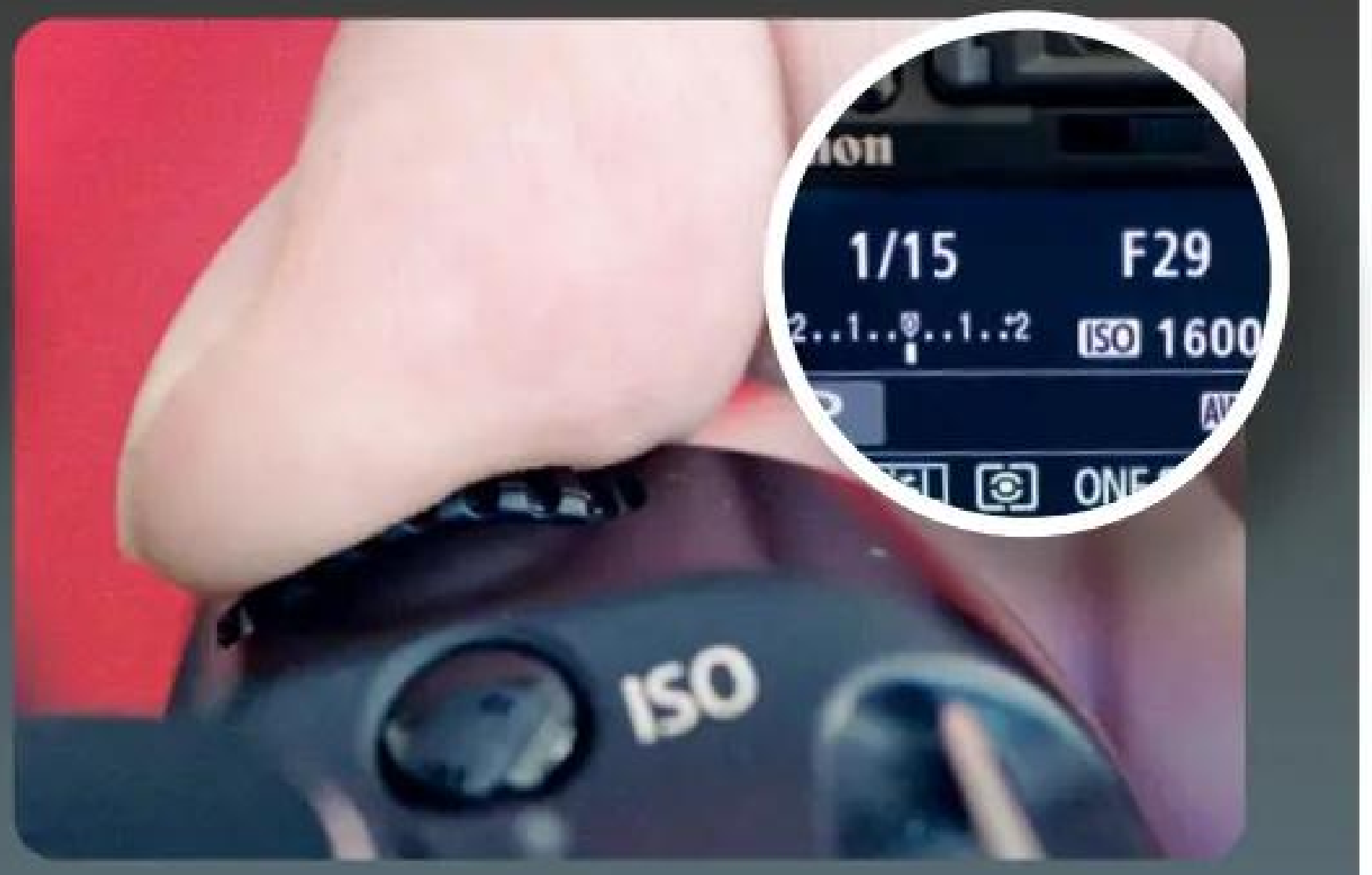
1 You set the Program mode by turning the top dial to P. This will set both aperture and shutter speed for you, based on the lens you are using, the ISO and the metered light level.



2 The settings are only suggestions – keep an eye on the speed and aperture set. Look at the values on the LCD and in the viewfinder (shown when you half-press the trigger).



3 If you want a faster shutter speed than suggested, or a wider aperture, turn the wheel behind the trigger to the right (clockwise). The settings change in the viewfinder (or LCD).



4 If you want a slower shutter speed, or a narrower aperture, turn the wheel to the left (anti-clockwise), until you have shifted the settings shown to where you want them.

Understanding the Basic Zone

Most EOS models offer these pictogram modes. They restrict the amount of user control. All set the default Evaluative metering mode, disable exposure compensation, and set the ISO for you automatically. All, except the 50D, won't let you record in RAW.

Portrait mode

Priority: restricting depth of field. **Exposure program:** sets the aperture to the widest it thinks wise for the lighting, in order to blur the background. **Picture style:** Portrait. **Drive mode:** Continuous. **AF mode:** One-shot. **Flash**: auto (with red-eye reduction option).

Landscape mode

Priority: maximising depth of field. **Exposure program:** sets the aperture to the smallest it thinks wise for the lighting conditions, so as to try to blur the background. **Picture style:** Landscape. **Drive mode:** Single. **AF mode:** One-shot. **Flash:** disabled.

Close-up mode

Priority: restricting depth of field. **Exposure program:** sets as wide an aperture as it thinks wise for the lighting conditions, so as to try to blur the background. **Picture style:** Standard. **Drive mode:** Single. **AF mode:** One-shot. **Flash:** auto.

Sports mode

Priority: freezing movement. **Exposure program:** sets the fastest shutter speed it thinks suitable for the lighting conditions. **Picture style:** Standard. **Drive mode:** Continuous. **AF mode:** AI Servo. **Flash:** disabled.

Night portrait mode

Priority: balanced flash exposures in low light with nearby subjects. **Exposure program:** sets shutter speed slow enough so the background is not dark. **Picture style:** Standard. **Drive mode:** Single. **AF mode:** One-shot. **Flash:** auto.

Flash off mode

Priority: for low-light scenes where flash not necessary or forbidden **Exposure program:** sets both shutter speed and aperture for decent low-light exposure. **Picture style:** Standard. **Drive mode:** Single. **AF mode:** AI Focus. **Flash:** disabled.

solutions. The Portrait mode will set an aperture to blur the background, for instance – but this is not desirable in all pictures of people. More troubling to the serious photographer, however, is that these Basic Zone options take control of other camera settings, too. They set the autofocus mode and white balance for you, for instance – and usually won't let you shoot in RAW or change your motor drive setting.

The third group are best described as miscellaneous. The A-DEP setting, for instance, is a clever option that uses the multiple-point autofocus system to try and maximise depth of field across the main part of your picture. It can be very useful – but needs to be used with caution (see the Step by Step, below, for some pointers).

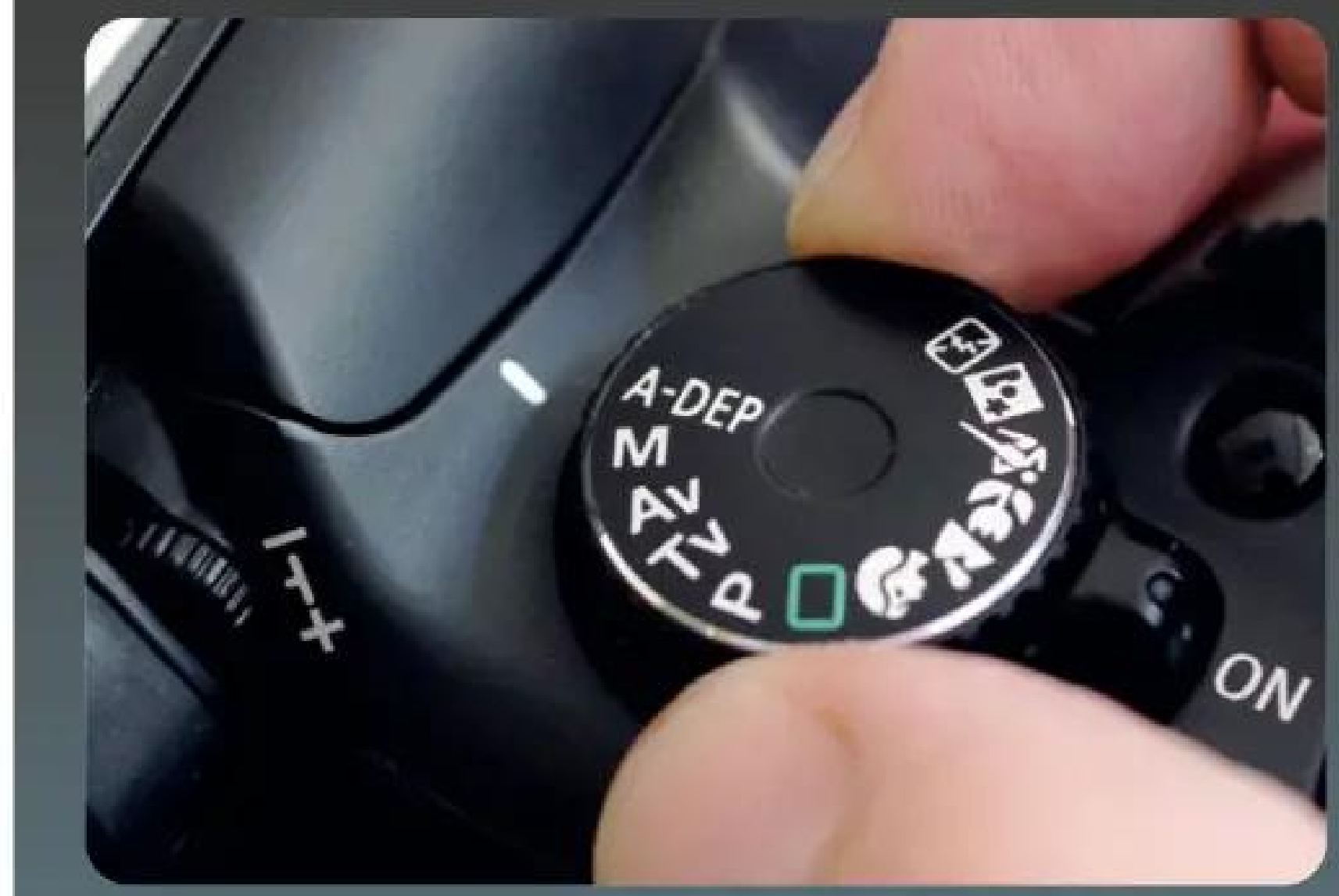
Tv or Av?

It is the first group, however, that you really need to learn to use. But which of the four Creative Zone options is best? Av or Tv? P or M? Which a particular photographer uses often comes down to personal taste. But it is worth learning the advantages of each.

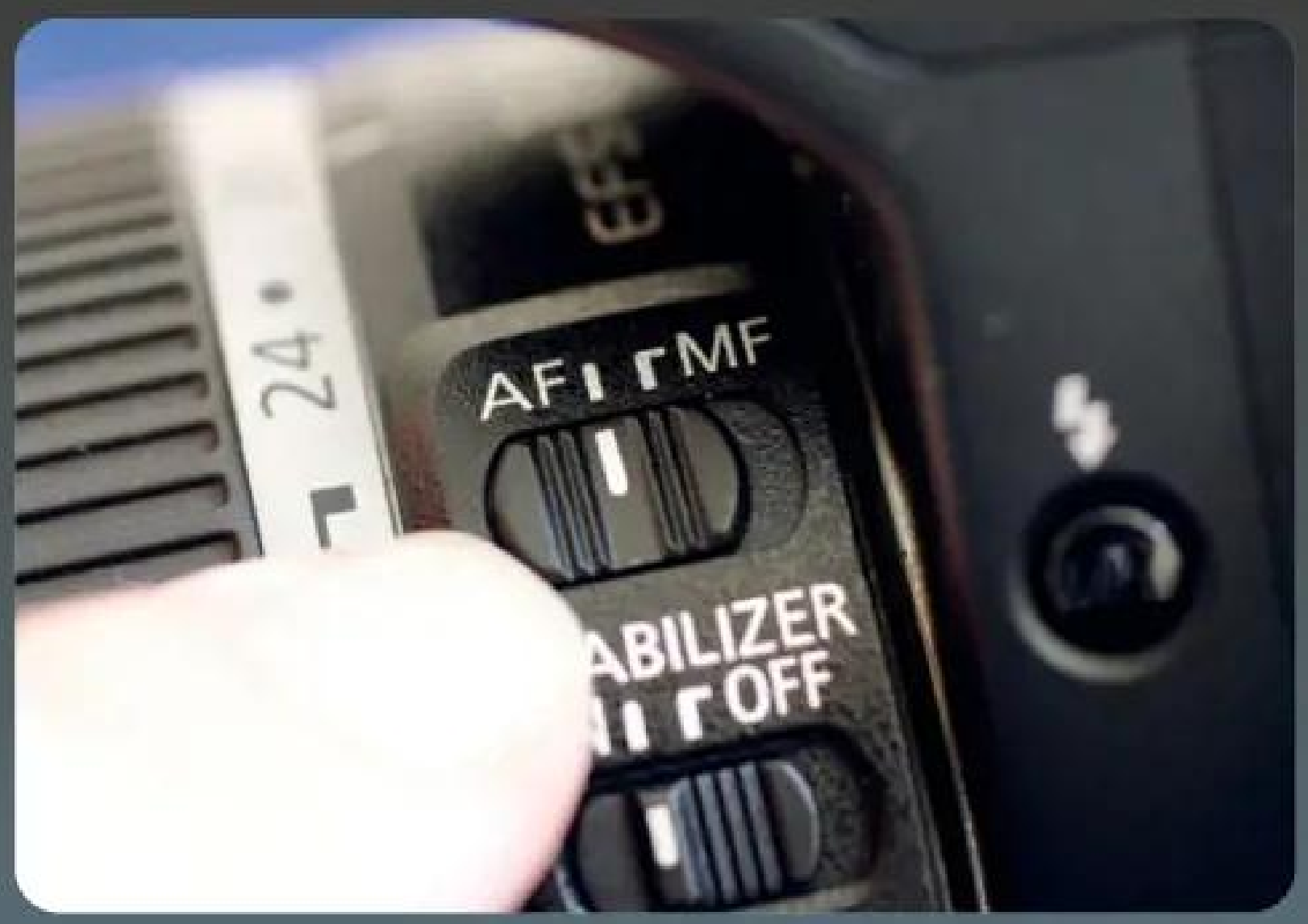
Av stands for Aperture Value – but is known as Aperture Priority. Here you set the aperture, and the camera sets the shutter speed for you to ensure a good exposure (based on the ISO used, the brightness of the scene, and the metering option you have set). Av is undoubtedly the most versatile mode. Despite its name, you can use it to set a particular shutter speed just as quickly as a particular aperture (you just turn the dial until the desired setting is displayed).

Tv works in the opposite way. Standing for Time Value, and better known as Shutter Priority, you set the shutter speed and the camera sets the aperture to suit. It is less useful than Av, as it is too easy for the camera not to have a suitable aperture to pair with your selected speed. The range of apertures available is much more limited than the range of shutter speeds – so it is good

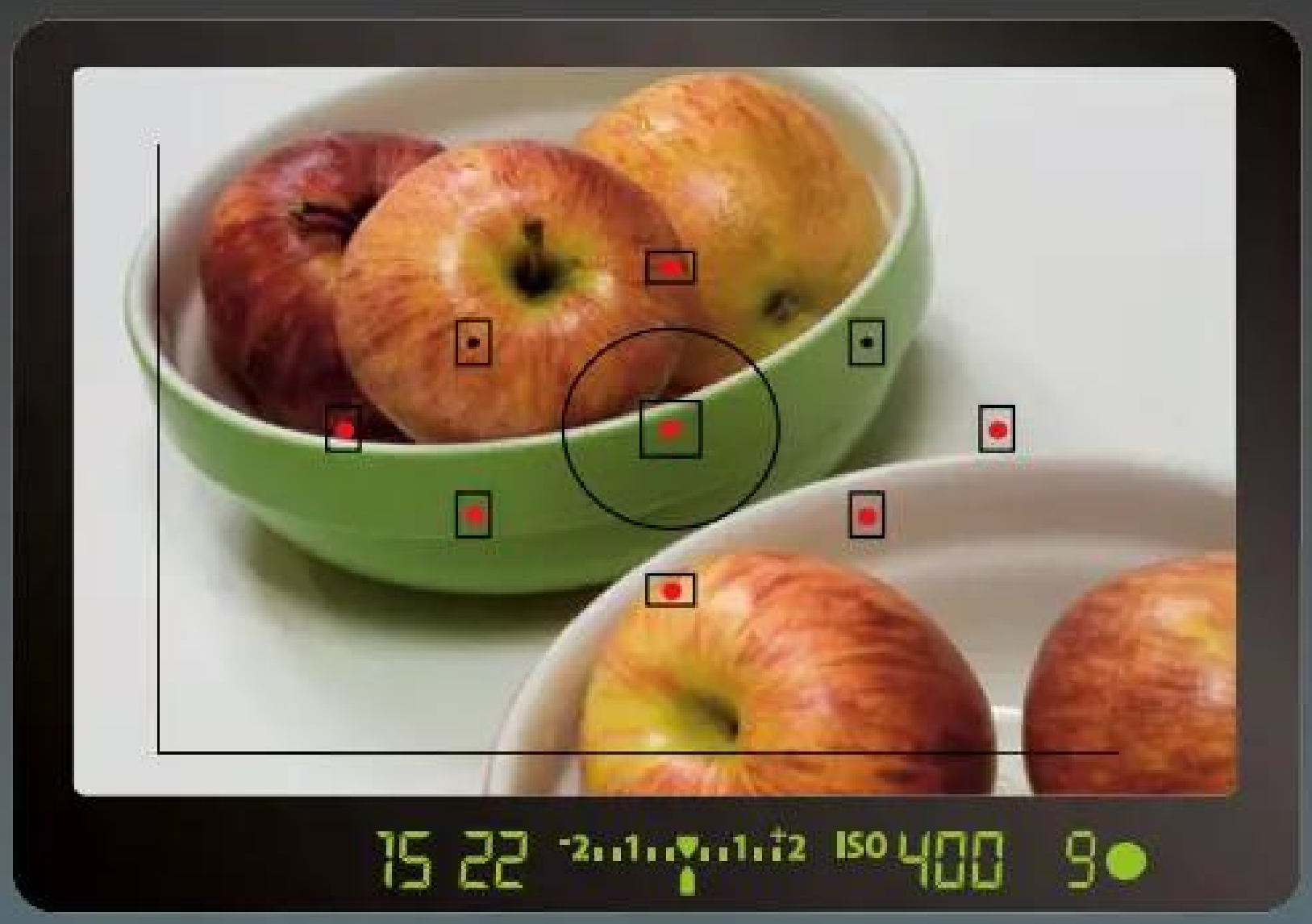
STEP BY STEP Master the tricky A-DEP mode



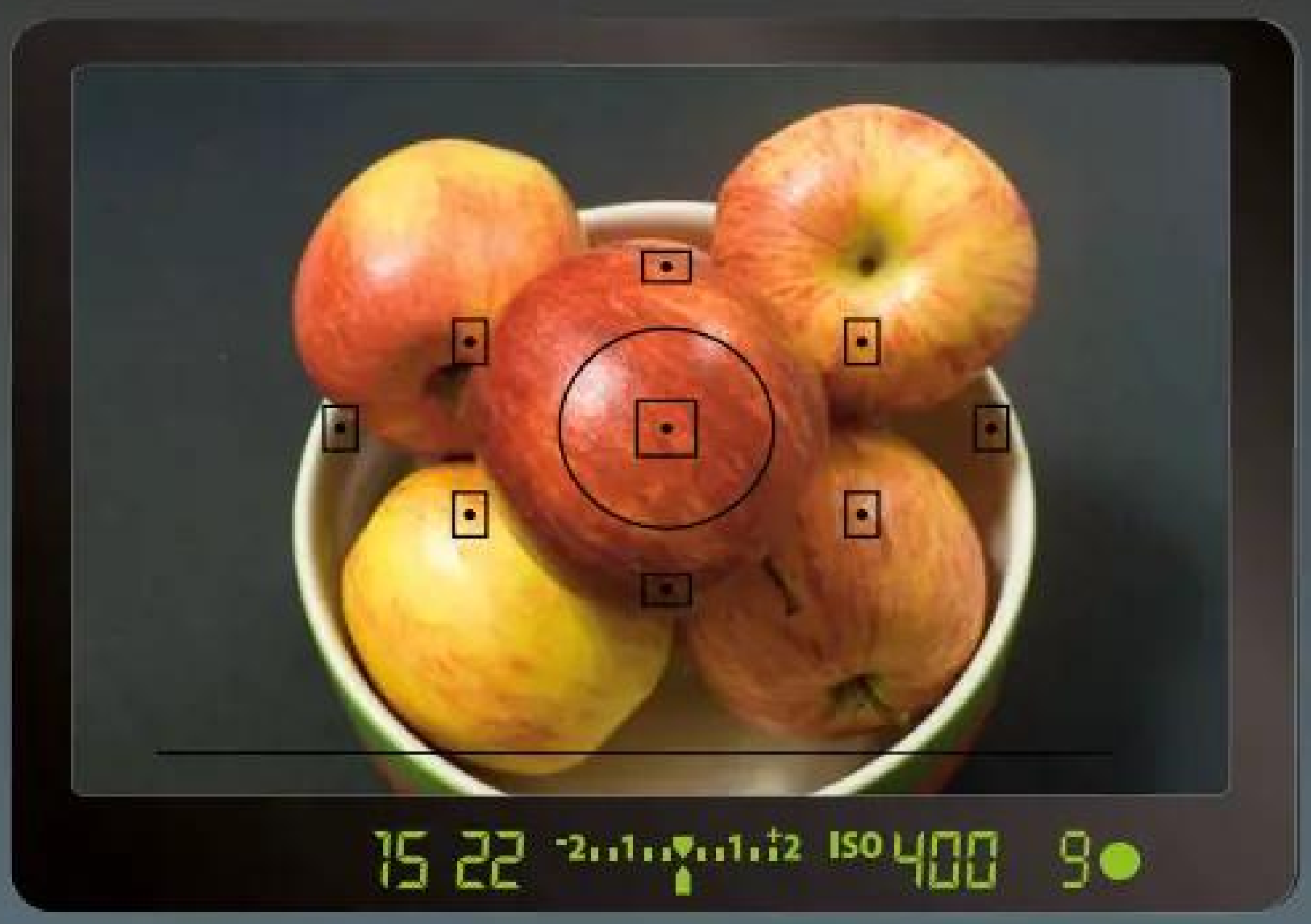
1 The A-DEP mode adjusts both shutter speed and aperture for you automatically. The aperture is set to ensure enough depth of field to keep key points in the picture in focus.



2 The A-DEP mode doesn't just adjust the aperture in its quest to maximise depth of field, it also optimises the focus point – so the lens must be set to its AF position (and not MF).



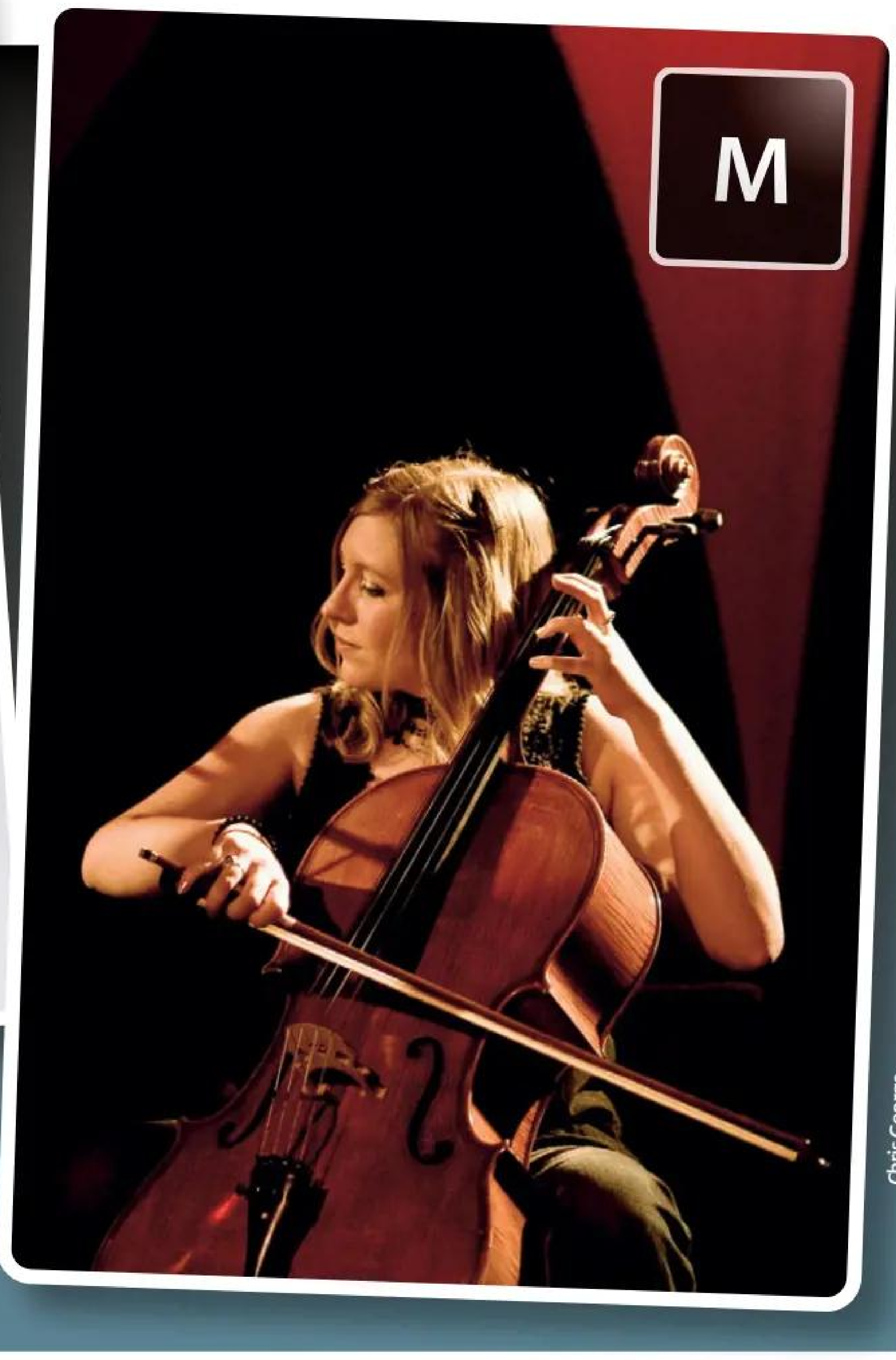
3 Half-press the trigger, and A-DEP tries to measure the distance at all the SLR's AF points, ignoring ones it can't get a reading from. The ones used light up red in the viewfinder.



4 Check which AF points light up – these need to correspond with the points you want sharp in your shot. Small changes in composition make a huge difference to the settings.

Dial M for Manual

Some seasoned photographers love to use Manual mode. Many do so out of habit, as this was the only option on the cameras they learnt their craft. However, being able to set the aperture and shutter speed independently can have its advantages in certain situations – where you either want to completely ignore the built-in meter, or if you want to use the metered reading only for occasional guidance. Even in Manual, the viewfinder display continues to provide an indication of what the meter thinks of your settings! Manual is particularly useful with studio flash – where shutter speed and aperture are set for the subject, and the flash output adjusted to give the right exposure. Manual is also useful in situations when taking a series of shots, where the background or subject clothing may change between shots, although the lighting remains consistent.



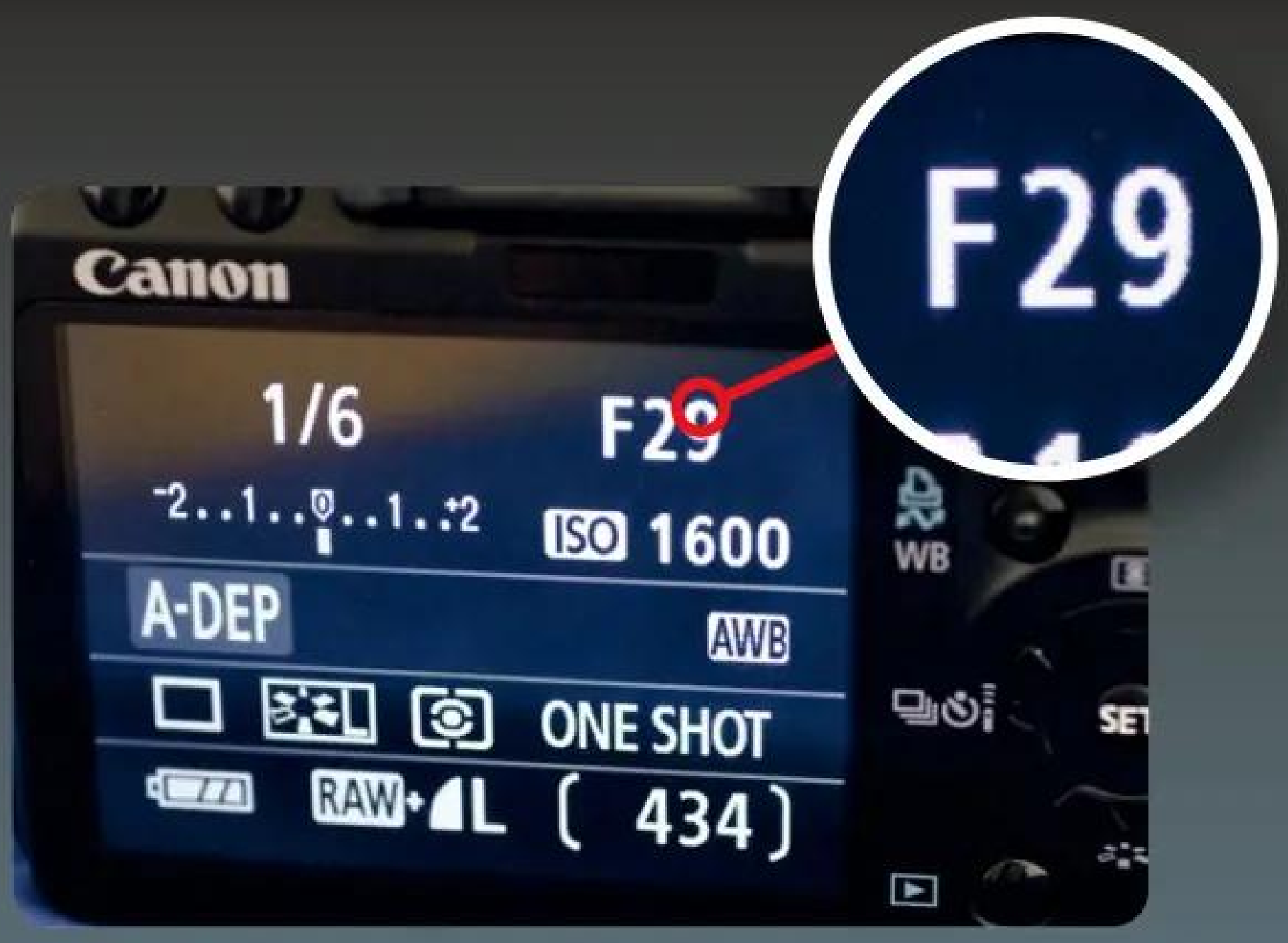
Chris George

Manual exposure is good option in the studio (above), or when shooting a sequence against a dark backdrop (right)

practice to specify this yourself. Tv does come into its own with certain types of creative photography, where precise shutter speed is needed to create a particular effect – such as blurring movement or panning.

In Manual (M) mode you set both aperture and shutter speed; we look at the times this can prove useful in the box above.

Last, but not least, is P or Program. This is an excellent fail-safe option for those starting out with the Creative Zone modes. The camera will set the aperture and shutter speed for you – essentially choosing a combination to help you avoid camera shake. But when you want to set a particular shutter speed or aperture you simply turn the dial. Unlike with the Basic Zone modes, you retain full control of all your camera's other overrides and settings. ■



5 Keep a particular eye on the aperture setting. If it flashes, then even using the narrowest possible aperture, the A-DEP system cannot adjust the focus so that all the points lit in the viewfinder will be pin-sharp.

YOUR ASSIGNMENT! Try a new mode!

It is important to learn that the exact choice of exposure mode is not crucial – in many situations you can use any of the main Creative Zone options and get the identical combination of shutter speed and aperture. Use this exercise to try a mode that you haven't tried before!

1 Find something to take a close-up of. We've used a frog – but a favourite ornament from hour mantelpiece may be an easier option!

2 Set the exposure mode dial to P. Use the main dial to set the widest aperture available with your lens (typically, between f/2.8 and f/5.6). Take a picture.

3 Repeat this using the Av mode – again using the main dial so that you are using the widest aperture your lens allows.

4 Take another picture, but this time use the Tv mode and turn the main dial so that shot is taken with the widest aperture.

5 For your final picture switch to M mode. Set the widest aperture, then adjust the shutter speed until the exposure mark is zeroed in at the middle of the metering scale.

Chris George

LESSON 7

How should I use metering modes?

Evaluative

Chris George

Spot and partial metering is a good choice if the background behind your subject is particularly brighter (or particularly darker) than the subject

Centre-weighted

Evaluative metering is good for off-centre portraits, whilst Centre-weighted metering excels if the subject is in the middle of the frame

Measuring the brightness of the scene you are photographing is a crucial part of getting the right exposure for your pictures. In the previous few lessons of SLR College, we have looked at shutter speeds, apertures and exposure modes – but even before these can be set or chosen you need to measure the brightness of the scene. This is where the exposure meter comes in.

Your EOS DSLR has a built-in meter, of course – and you would be forgiven for thinking that its task was straightforward. But, unfortunately, it is not simply a matter of taking a single reading. For starters, the brightness of the scene can vary enormously across the picture – the sky will usually be much lighter than the foreground, for example – so some form of average reading needs to be used. Arriving at the perfect average is not made easier by the fact that the key area of your image will vary according to your composition, and exactly what you want to highlight in your image.

To allow for this, your Canon SLR has not just one exposure meter system – but three or four (basic models make do without the Spot metering option). Some of these are better in some situations than others. But there is not a single right choice – which of the metering ▶

The 18% rule

⬜	🟥
18% grey	18% red tone
🟩	🟦
18% green tone	18% blue tone

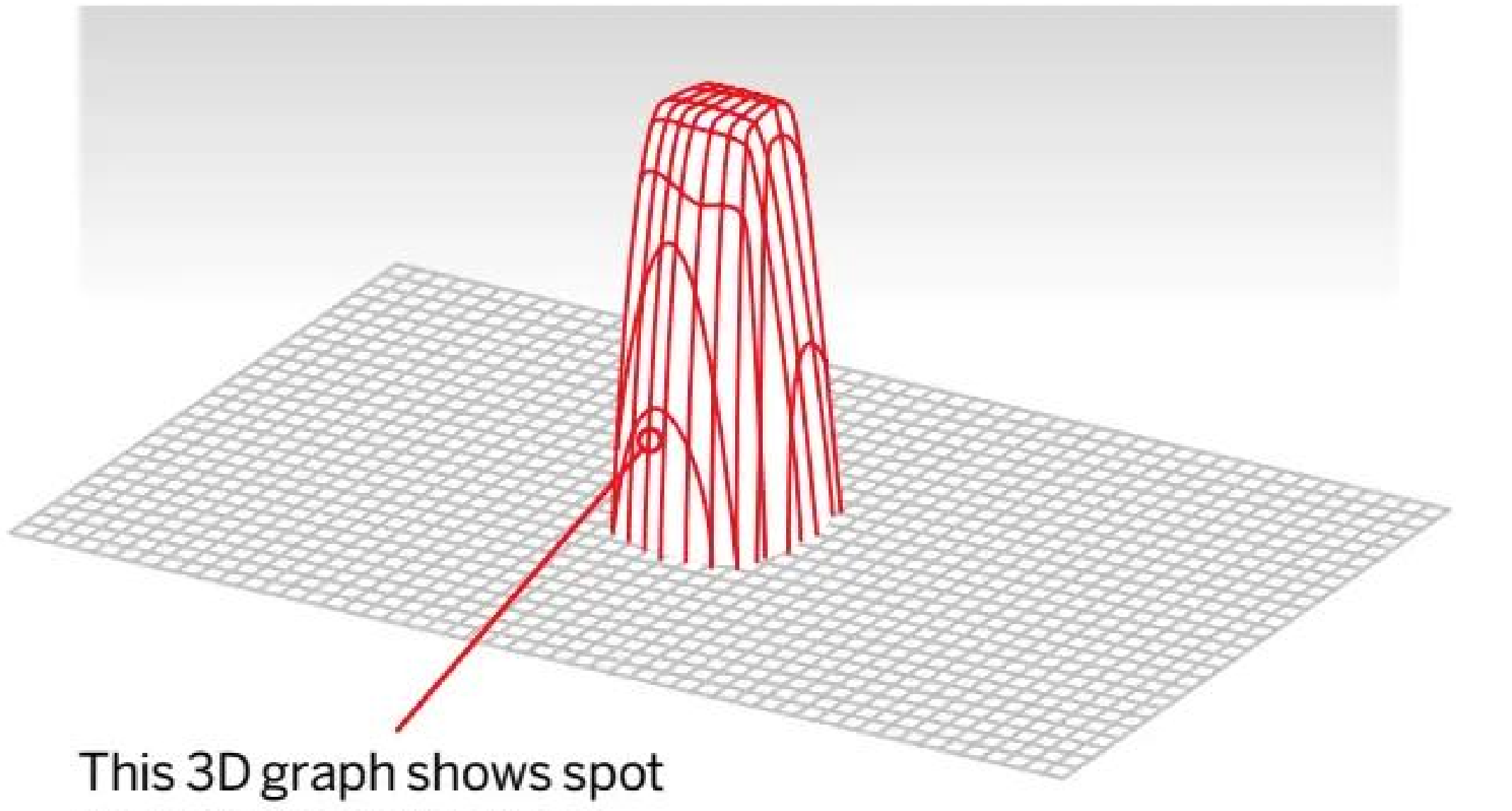
Each metering mode assumes there is an even spread of brightnesses through the area it is measuring from, which average out at an grey tone that reflects 18% of the light falling on this part of the scene. Every colour is taken into account in this average brightness.

At-a-glance guide to metering modes

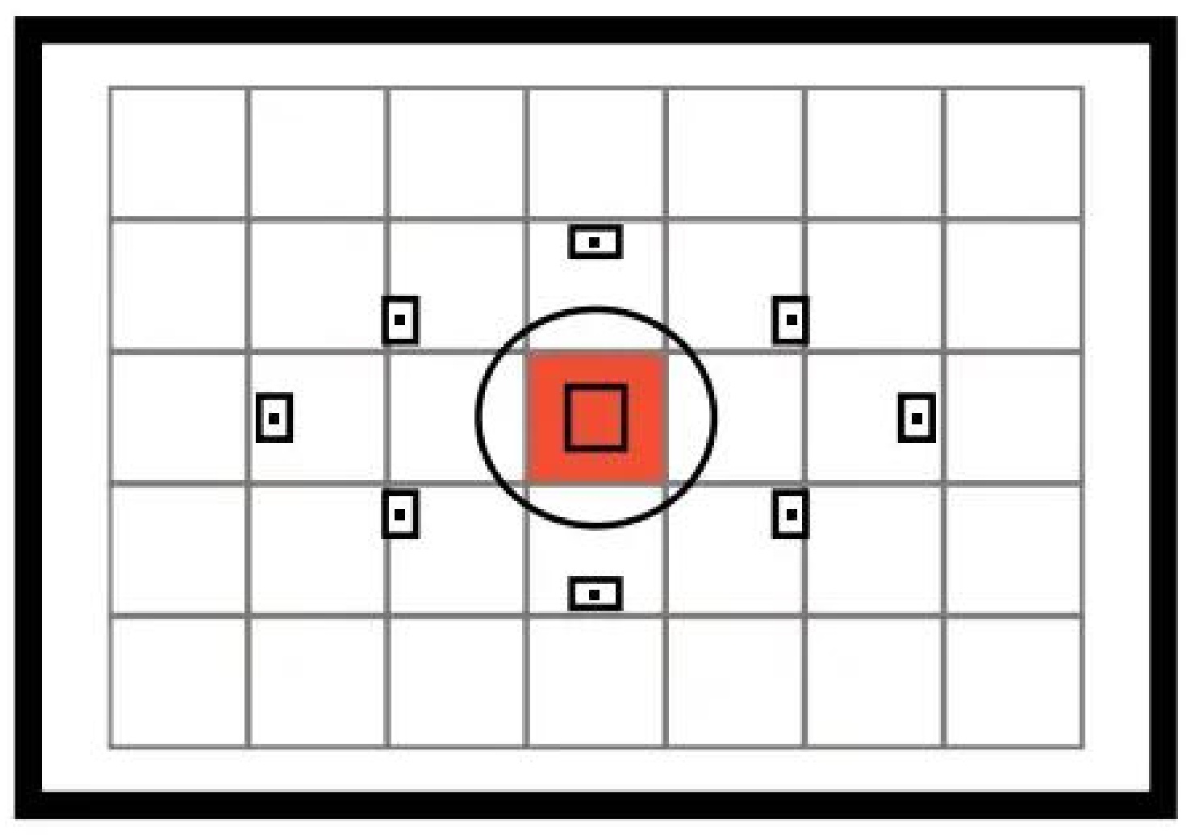
How each of the metering patterns works, and when to use them

Spot metering

Spot metering only measures the intensity of light over a small circular area in the centre of the viewfinder. The average is calculated by measuring just 2-4% of the picture area (depending on the model, turn the page). Not all EOS models offer spot metering.



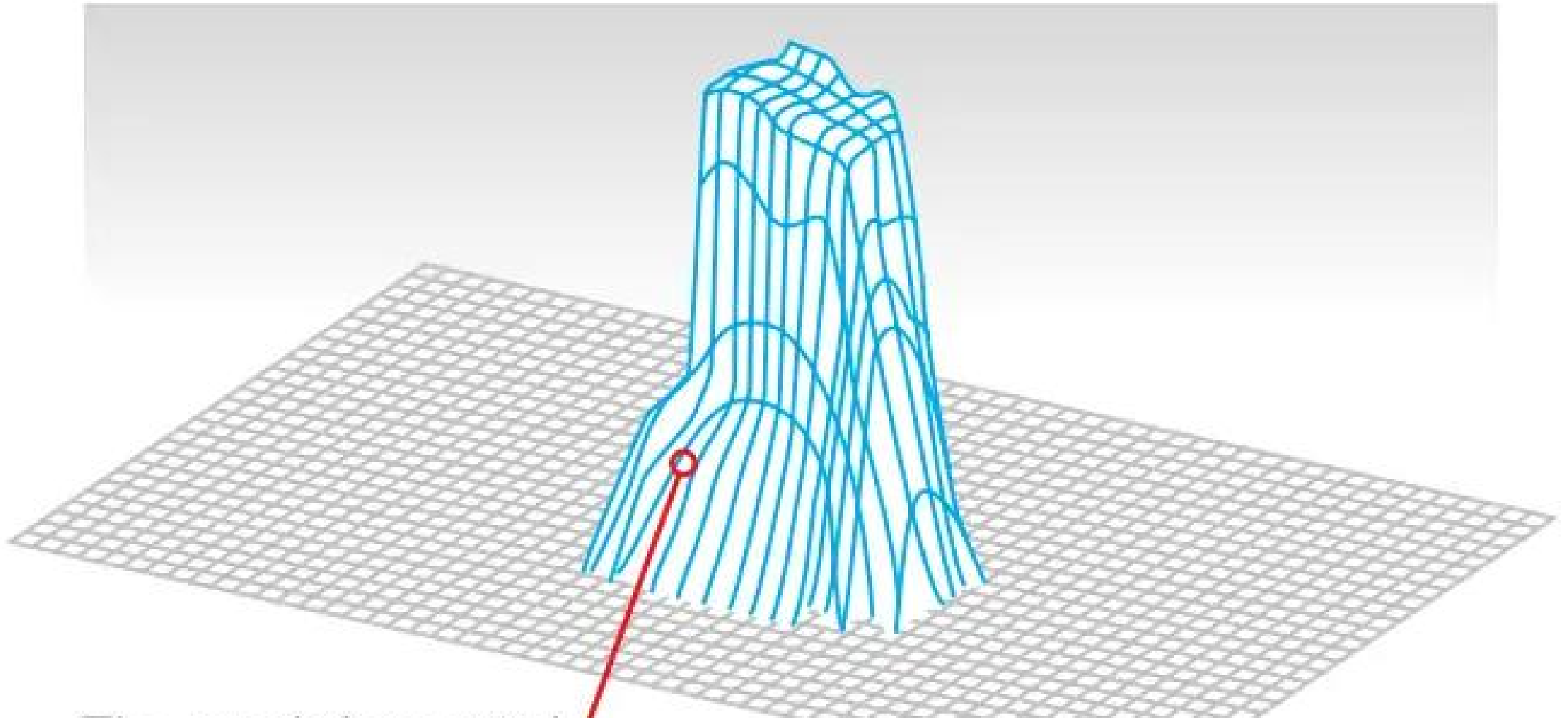
This 3D graph shows spot metering's central bias



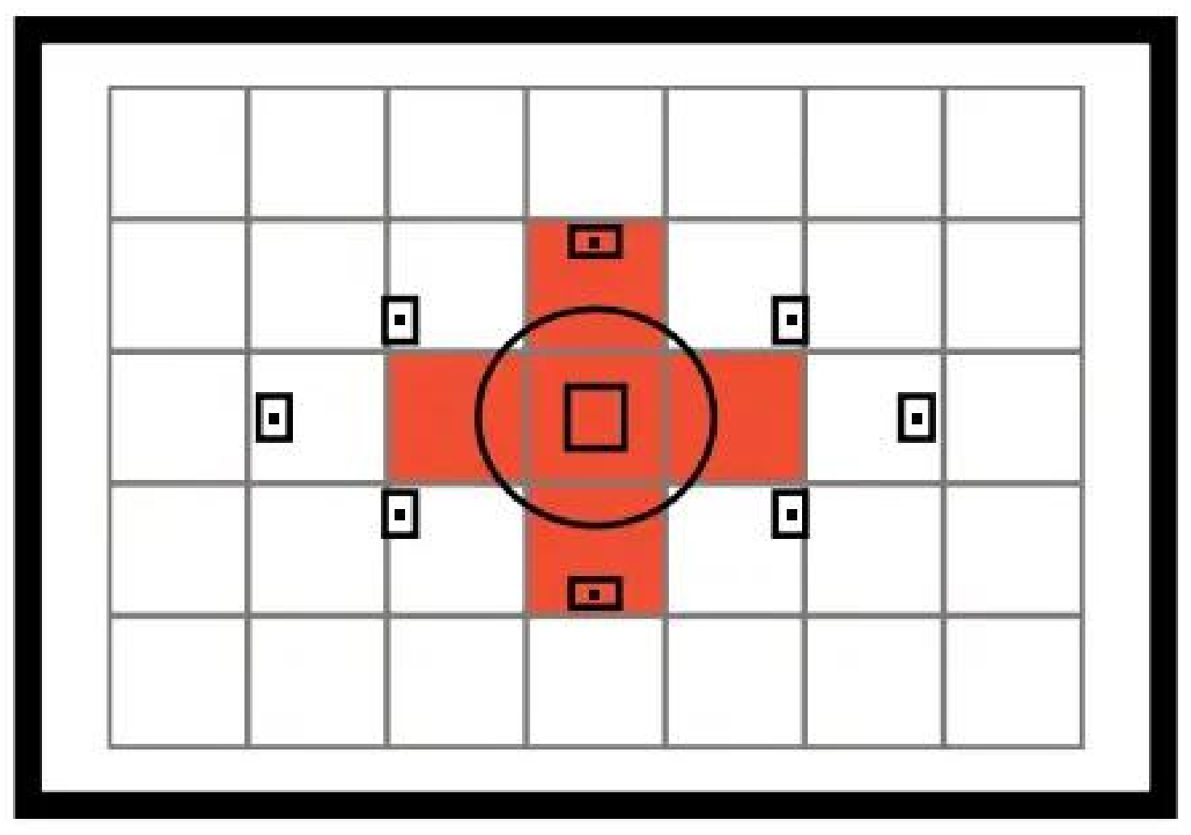
The centre circle in the viewfinder gives a rough guide to a spot meter's coverage

Partial metering

All EOS models offer this metering mode. It measures the intensity of the light over a larger circular area than in Spot mode. The average is calculated by measuring 8-13% or the picture area (depending on the model, turn the page).



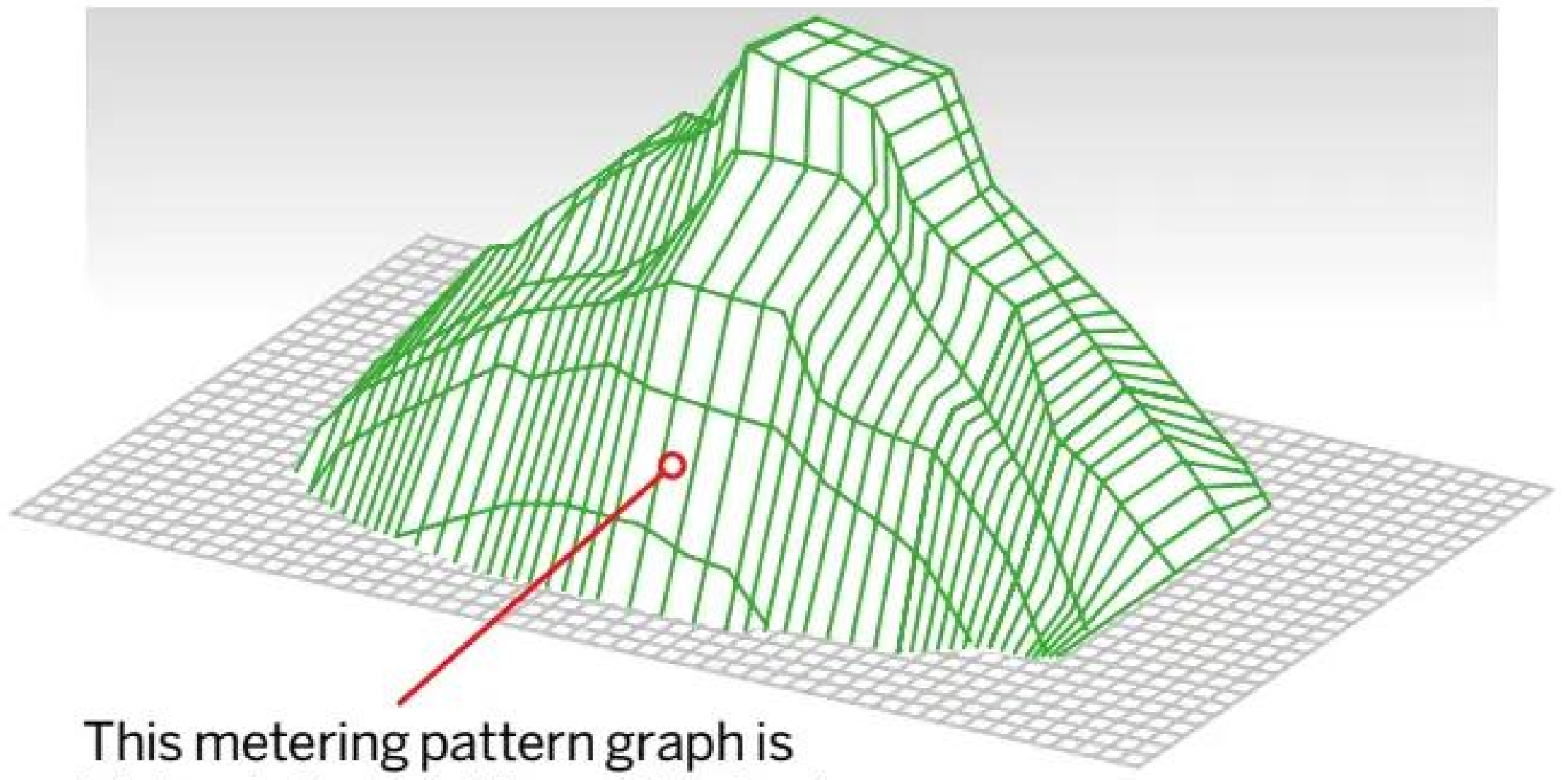
The graph for partial metering spreads further across frame



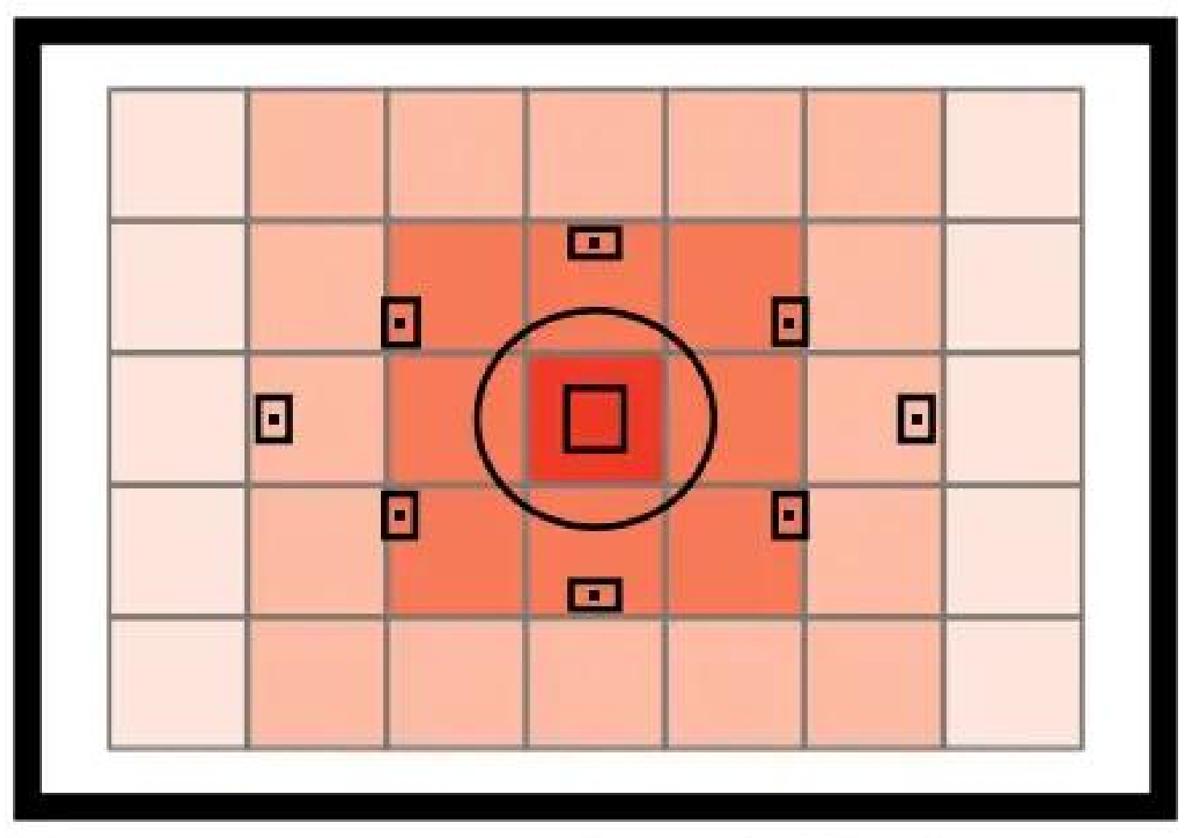
The coverage of the partial meter spreads out beyond the viewfinder's centre circle

Centre-weighted average metering

This light metering mode measures the light across the whole picture area, but strongly biases the reading to the centre of the viewfinder area. Unlike with Evaluative, it does not take the focus into account, so uses the same averaging pattern for every shot. Found on all EOS DSLRs.



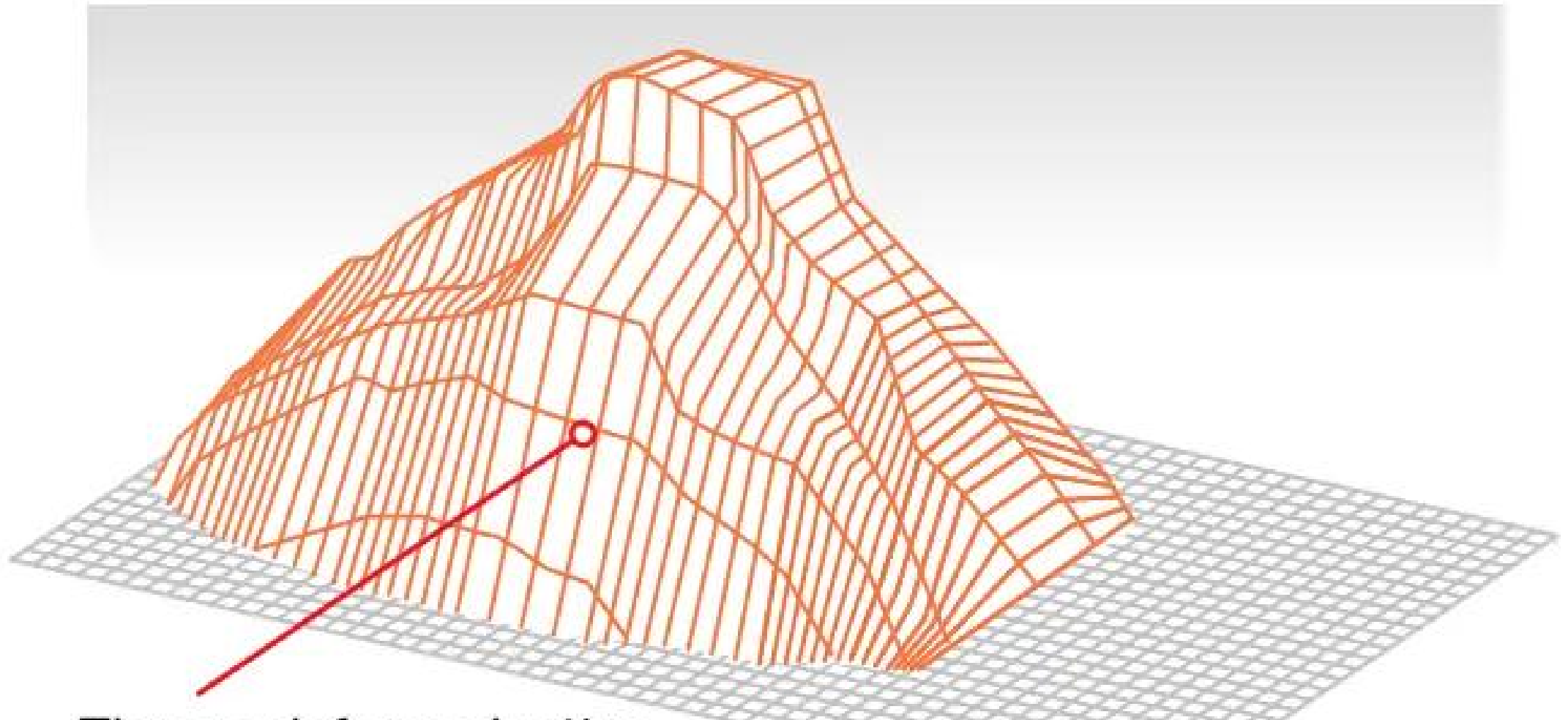
This metering pattern graph is higher in the middle, as this is where the meter concentrates its attention



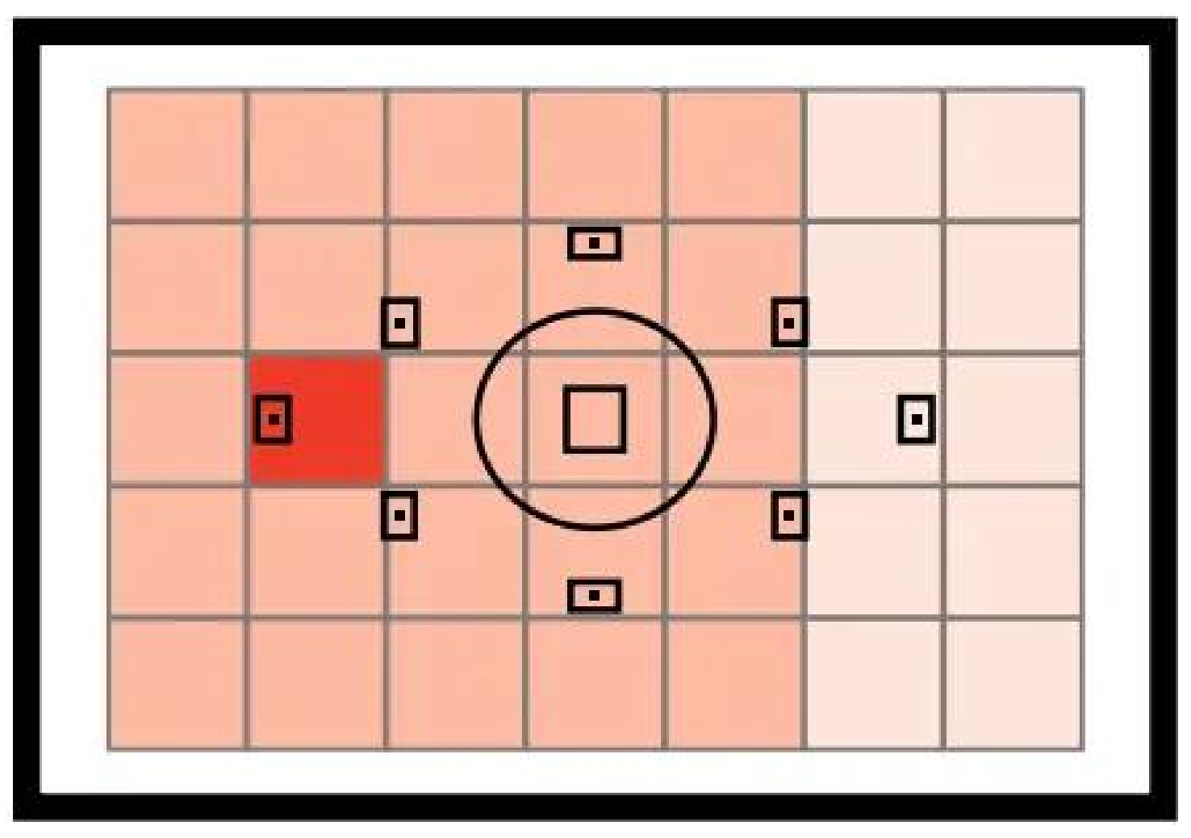
Main metering zone is bounded by the seven central focus points (SLRs with nine AF points)

Evaluative metering

The default metering mode on EOS DSLRs, and the only option if you choose one of the basic automatic exposure modes (see previous lesson). Measures light across the whole frame, but strongly biases the reading to the area around the autofocus point currently being used.



The graph for evaluative metering changes shape, depending on where the subject is

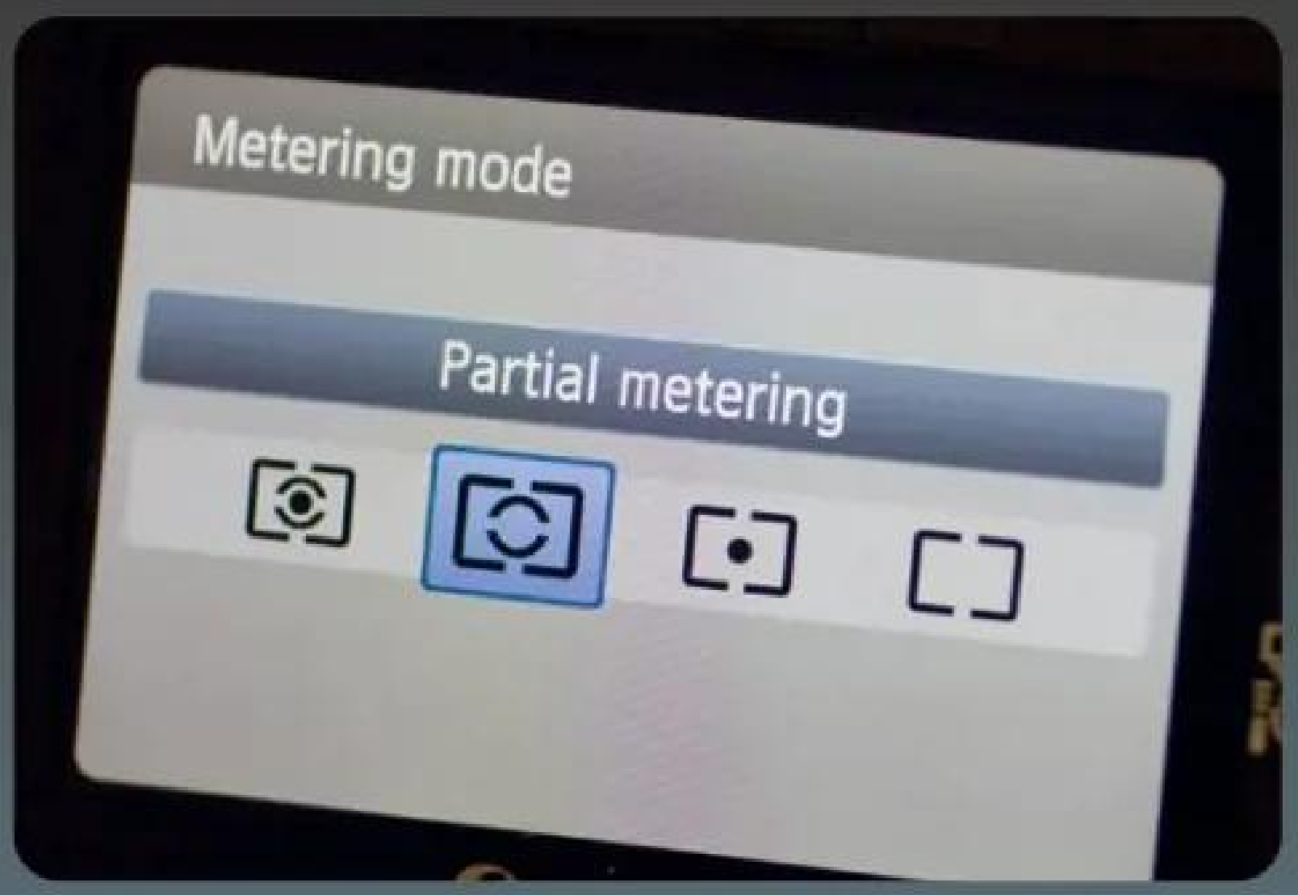


Main zone of interest will depend on which of the autofocus points has been used

STEP BY STEP How to switch metering modes

ISO
SET
WB
AF

1 Press the Metering Mode button on your camera – symbolised by an eye-shaped icon in a rectangle. On some recent models this is accessed using the Quick Menu button.



2 You will have either three or four metering modes. The four symbols above (from left to right) represent Evaluative, Partial, Spot and Centre-weighted options.

3 Use the Main Dial (or the right and left cursor keys at the back of the camera) to cycle through the options and switch from one metering mode to the next.

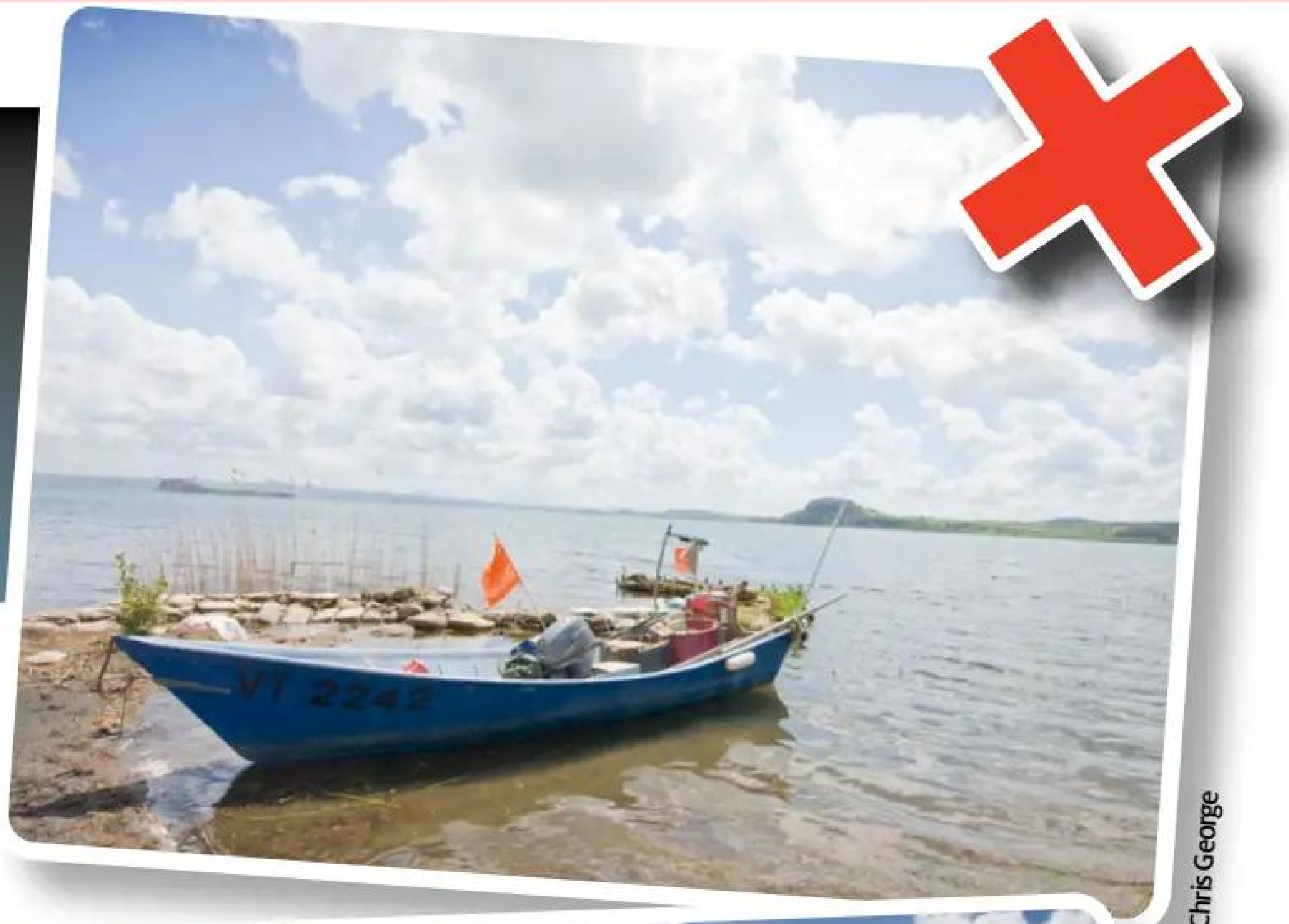
4 On some models you will need to press the central Set button on the back of the camera in order to confirm the change you have made to the metering mode.

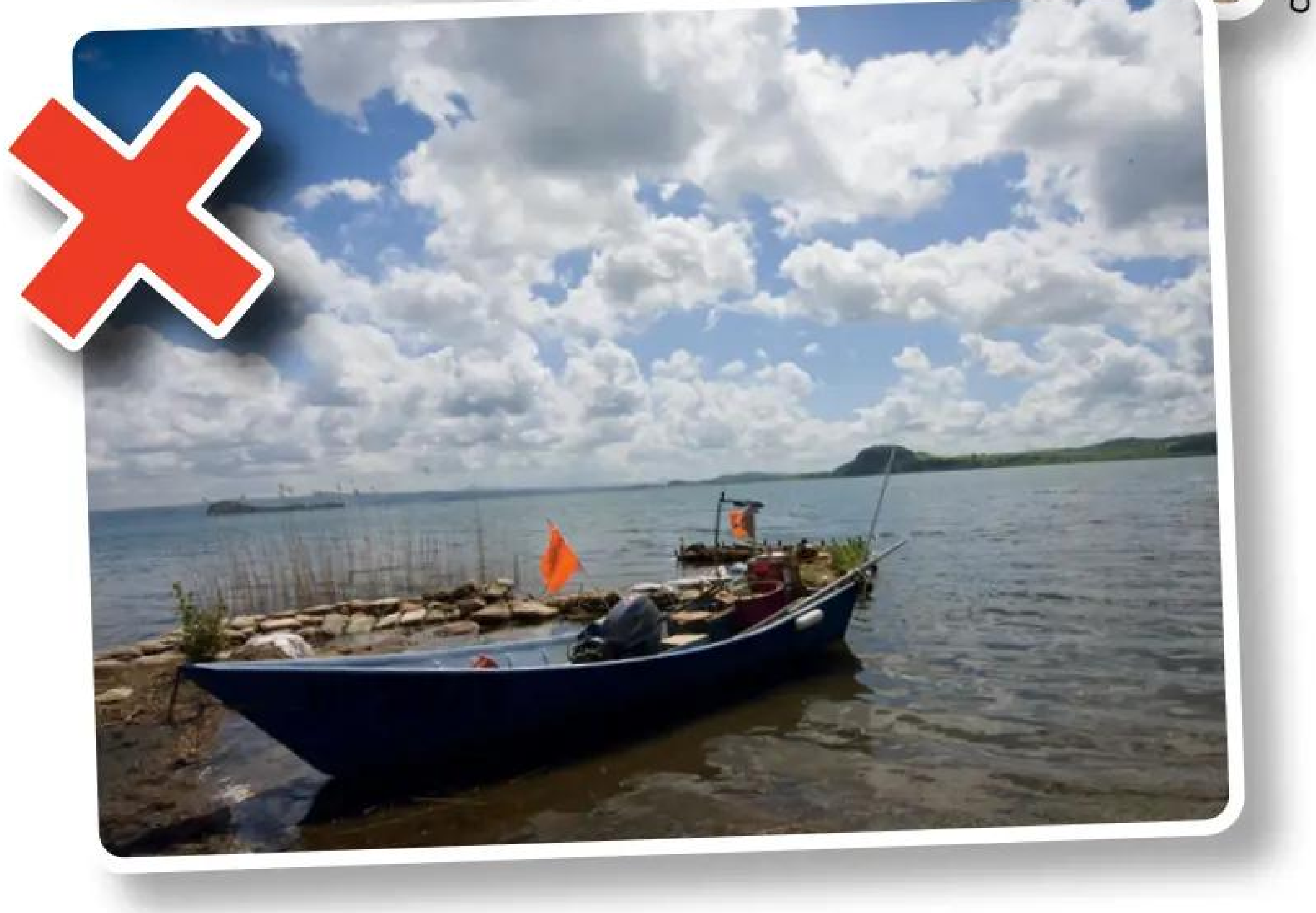
Watch the contrast

Digital cameras can only register a limited range of tones – and cannot see the full range of brightness the human eye can. This presents a problem in high-contrast scenes – where you have dark shadows and bright highlights – such as when photographing in the middle of a sunny day, when shooting towards the light, or when taking pictures of nightscapes.

EOS metering model by model

Model	Partial	Spot	Evaluative	Zones
1300D	10%	–	9 AF points	63-zone
100D	9%	4%	9 AF points	63-zone
200D	6%	2.6%	9 AF points	63-zone
450/500D	9%	4%	9 AF points	35-zone
650/700D	9%	4%	9 AF points	63-zone
750/760D	6%	3.5%	19 AF points	63-zone
800D	6%	3.5%	45 AF points	63-zone
60D	6.5%	2.8%	9 AF points	63-zone
77D	6%	3.5%	45 AF points	63-zone
80D	7.7%	3%	45 AF points	63-zone
5D Mk III	6.2%	1.5%	61 AF points	63-zone
5D Mk IV	6.1%	1.3%	61 AF points	252-zone
5DS/5DS R	6.1%	1.3%	61 AF points	252-zone
6D Mk II	6.5%	3.2%	45 AF points	63-zone
7D	9.4%	2.3%	19 AF points	63-zone
7D Mark II	6%	1.8%	65 AF points	252-zone
1D Mk IV	13.5%	3.8%	45 AF points	63-zone
1Ds Mk III	8.5%	2.4%	19 AF points	63-zone
1D X Mk II	6.2%	1.5%	61 AF points	216-zone


Chris George



High-contrast scenes means that there is no ideal exposure – if the exposure is set for the sky the boat is too dark, but expose for the boat and the clouds burn out

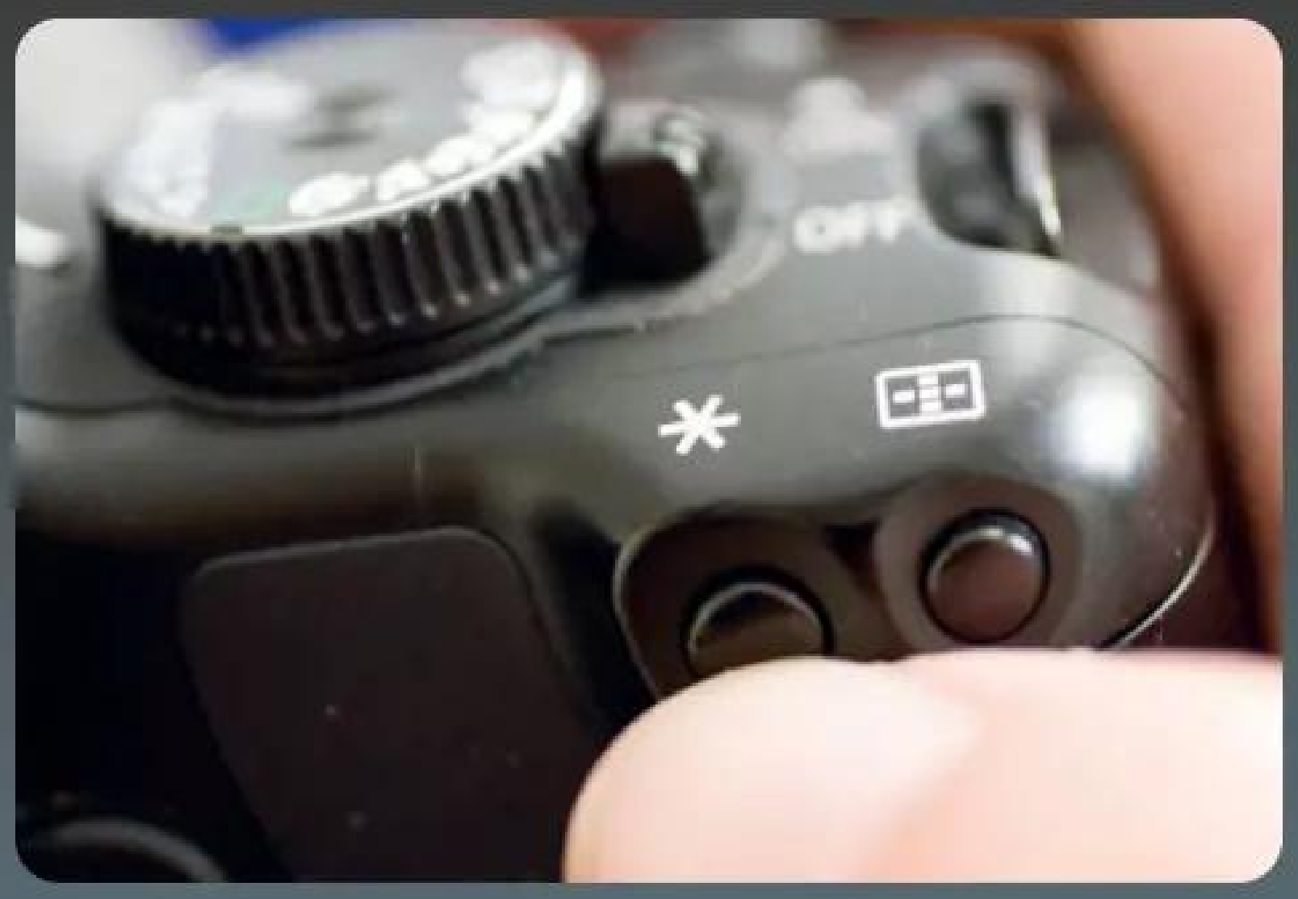
mode options you use in a given scenario depends just as much upon personal choice and personal experience as it does anything else.

The main metering mode, and the one that your EOS will be set to when you take it out of the box, is Evaluative (sometimes referred to as Matrix metering in textbooks). This is the only option that you will get in some exposure modes (you have to switch to M, Av, Tv or P modes to get to use the other metering mode options).

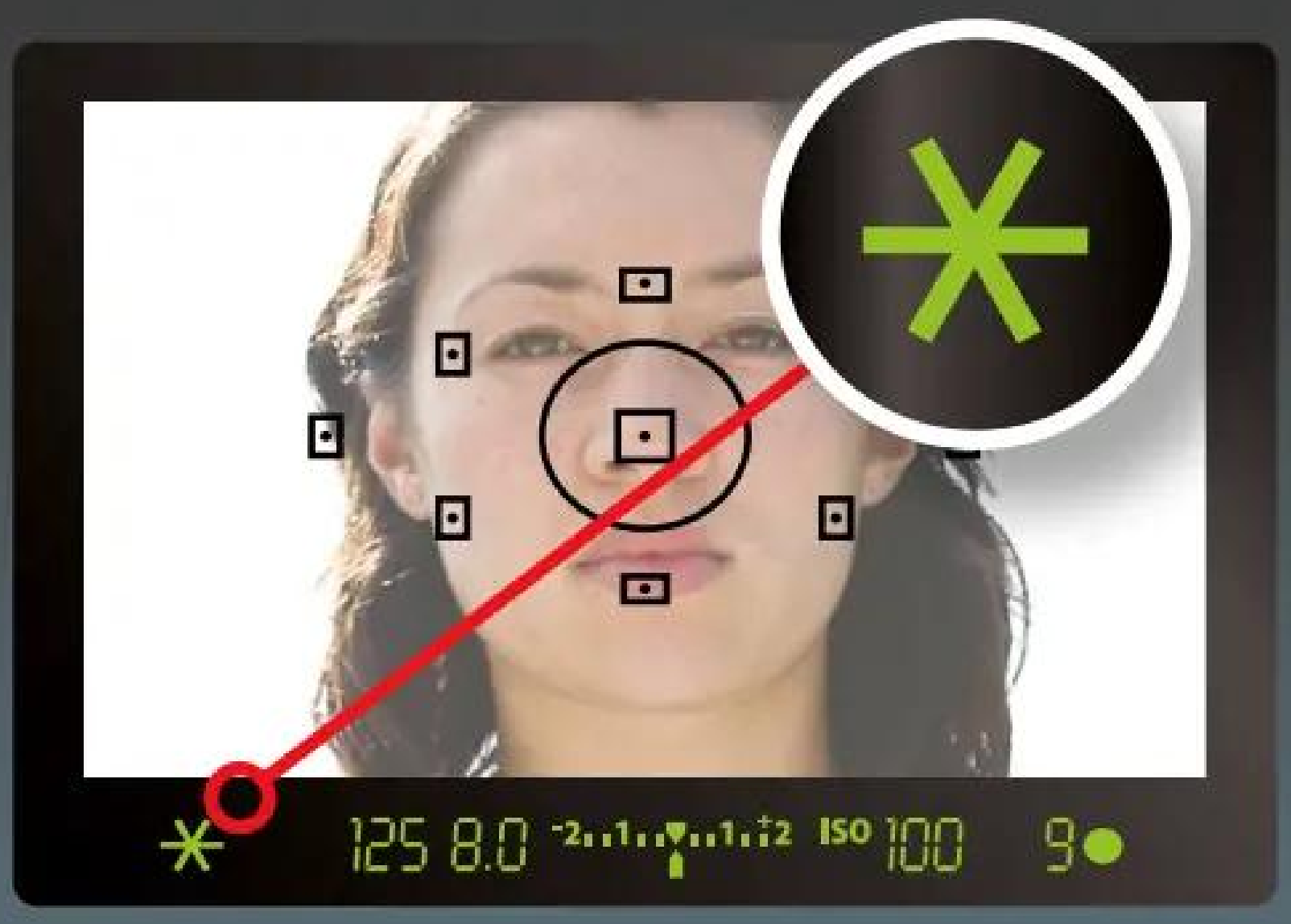
Evaluative metering is by far the most sophisticated of the metering types. It looks at the scene in an intelligent fashion, trying to work out what sort of picture you are taking – then

STEP BY STEP How to use Exposure Lock

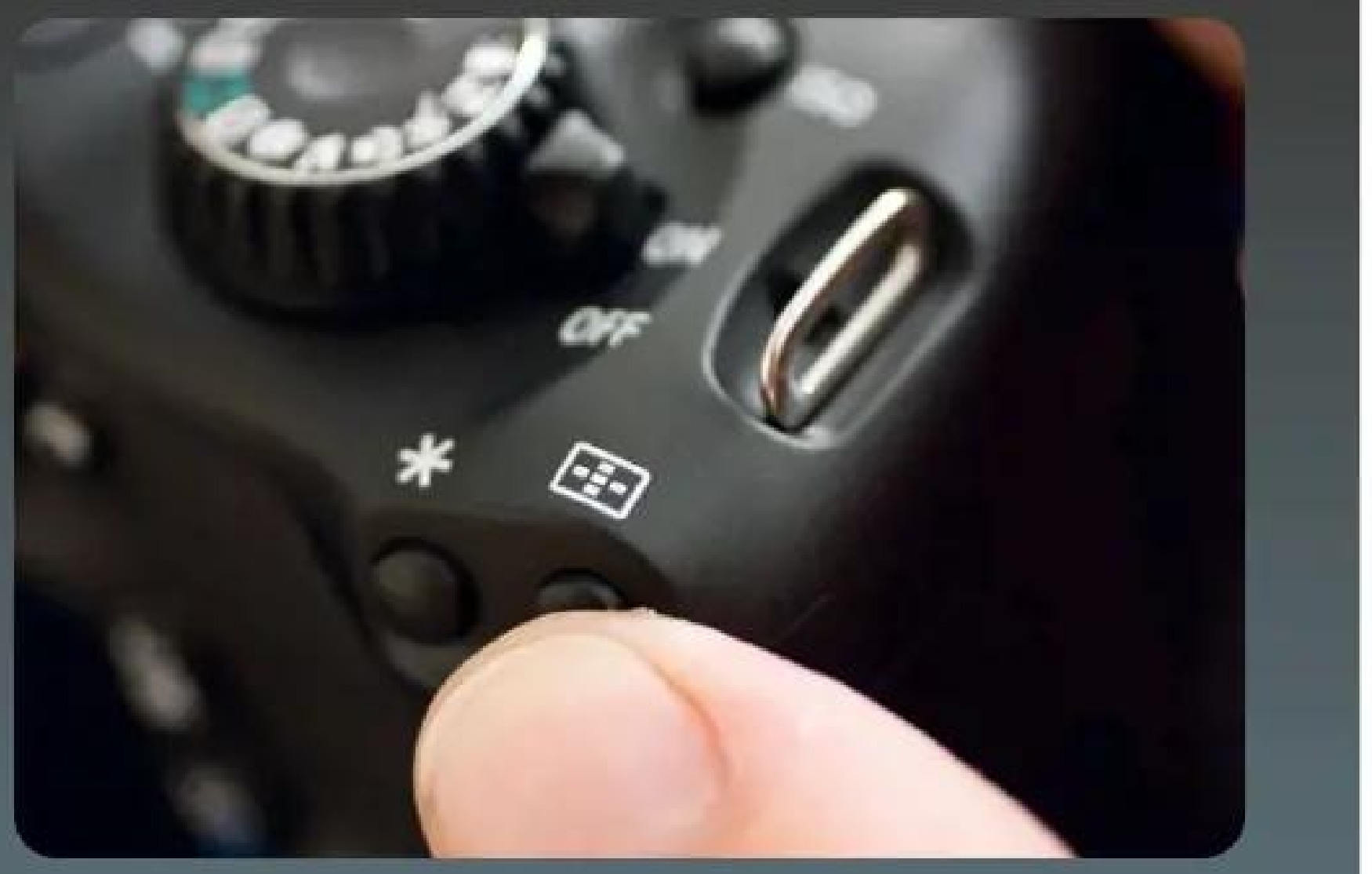
1 Gently press the trigger but of your EOS, this brings the metering system to life, giving you an exposure readout in the viewfinder and on the LCD screen.



2 Point the camera at the subject or area of the scene that you want to take a meter reading from. Press the star key on the back of the SLR to lock this exposure reading.



3 A green star appears in the viewfinder to show the Exposure Lock is activated. Now re-frame your shot and take your picture using the meter reading that you have saved.



4 If you want to cancel the Exposure Lock, and not use the saved meter reading, press the button to the right of the star button once. The green star will disappear.

relaying its suggested average brightness used to create a shutter speed and aperture combination. This metering pattern breaks the scene into a number of zones – creating a range of readings, which are then analysed to work out the type of picture you are taking. Most importantly, it uses information from the autofocus system to work out where the subject is in the picture. So if the AF point on the left is used in a particular shot, it will pay more attention to this area when working out its average. If you use manual focus, it will bias the metering to the middle of the screen.

Biasing the average towards the centre of the frame is essentially the game plan of the alternative Centre-weighted average metering mode. This doesn't take focusing into account, and just assumes that the subject is in the middle. It works well for most pictures – and it has the advantage is that this is the metering system that many older photographers grew up with. It is also easier to predict when this metering mode will get things 'wrong' so you can anticipate when Exposure Compensation will be necessary. And if the subject is not slap-bang in the centre of the frame, it can still be successful, simply by using it in conjunction with the Exposure Lock (see opposite).

Spot checks

Two further modes are also found on Canon DSLRs. The Partial and Spot metering modes take a much simpler approach and simply take a reading from a small area in the middle of the frame – ignoring everything else in the picture. The difference between the two is that the Partial metering area is about three times larger than that used by the Spot metering option. Spot metering is, therefore, the more precise of the two – but it is also harder to use – as you have to pick the spot that you use for the reading with care. Both are best used along with the Exposure Lock function – and come into their own when shooting subjects where the background is significantly darker – or lighter – than the subject (such as when you're photographing a spotlit actor on a stage, or when shooting a portrait of a skier surrounded by a snowy landscape).

Error alert

It is important to realise that, whatever the metering mode you use, all will get the wrong result in certain situations. The problem stems from the way these metering systems work; they measure the light that is being reflected by the subject, rather than taking an incidental reading that measures the light actually falling on the subject. Unfortunately this reflected reading is skewed by the colour and brightness of the subject itself. Bright, white subjects reflect more light than dark ones. The averaging system, used by all the metering modes, assumes that the average from the zone or zones that it measures from is a midtone brightness (the '18% grey' often referred to by old-school photographers). For this reason, Exposure Compensation is always needed when photographing particularly light-toned or dark-toned subjects. ■

YOUR ASSIGNMENT!

Hit the right spot!

Spot and partial metering modes are great for taking precise exposure readings – and can be a godsend when taking shots in tricky lighting conditions. But the skill is in deciding which part of the scene to take the reading from in the first place. Practice makes perfect – so try this exercise and see how you do…

1 **Set up a back-lit scene, such as a person standing in front of a window (they don't have to be doing ballet, as in our example!). Frame the shot wide to include the room.**

2 **Set your EOS to spot (or partial) metering mode. Then take an meter reading from an area of the scene using the Exposure Lock. Take a shot, and review the picture to check the exposure.**

3 **Repeat the second step several times – but each time lock in an exposure from a different area of the scene. Do these versions give better – or worse – results?**

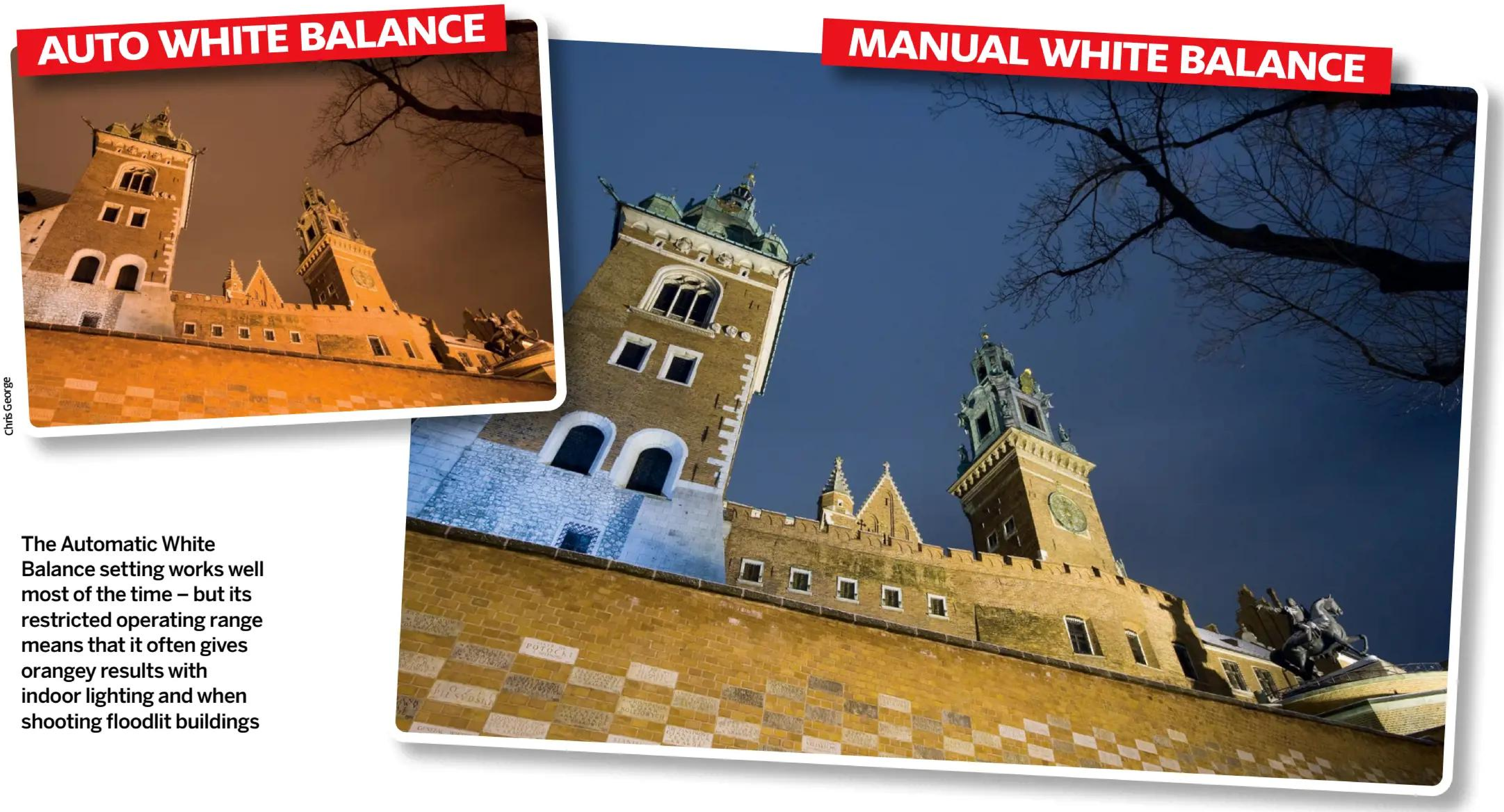
A question of compensation

Don't always expect to find a metering mode that will give you the ideal exposure for the picture. It is often essential to use exposure compensation to override the meter reading to get the result that you want. You will need this control most frequently when your scene does not conform to the mid-grey average that all four of the EOS metering modes assume. An obvious example includes a scene that is made up mostly of light tones, such as a snow scene or bulbs of garlic on a white backdrop – as in the example on the right. Here you will need to dial in +1 or +2 stops of exposure compensation. With subjects that are dark in tone, an amount of negative exposure compensation will be needed.

With an all-white subject you must use exposure compensation – or switch to Manual – to get the right exposure, whatever metering mode is used

LESSON 8

What is white balance all about?



Chris George

The Automatic White Balance setting works well most of the time – but its restricted operating range means that it often gives orangey results with indoor lighting and when shooting floodlit buildings

For those new to DSLRs, 'white balance' can be the one control that is completely new to them. The focusing modes, ISO setting, exposure options, drive facilities – and so on – are much the same as those found on the film SLRs that many of us once used. Up until the arrival of digital cameras, white balance would only have been familiar to those who delved into the advanced settings of a video camcorder.

White balance, or WB, is necessary because light does not just vary in brightness, but also in colour. Each light source has its own individual colour or 'colour temperature' – which as you move through the visible spectrum can vary from red to blue. Human vision is very good at compensating for this, so that a sheet of white paper will look white whether viewed in daylight or by candlelight. It is the job of the camera's white balance system to compensate for the colour differences in the lighting – so that the colours in the scene look exactly as we would expect them.

Your Canon DSLR has a wide range of options for controlling the white balance to suit the colour temperature of the light in the scene. However, your camera is supplied set to Automatic White Balance (AWB) – which will cleverly look after all this for you.

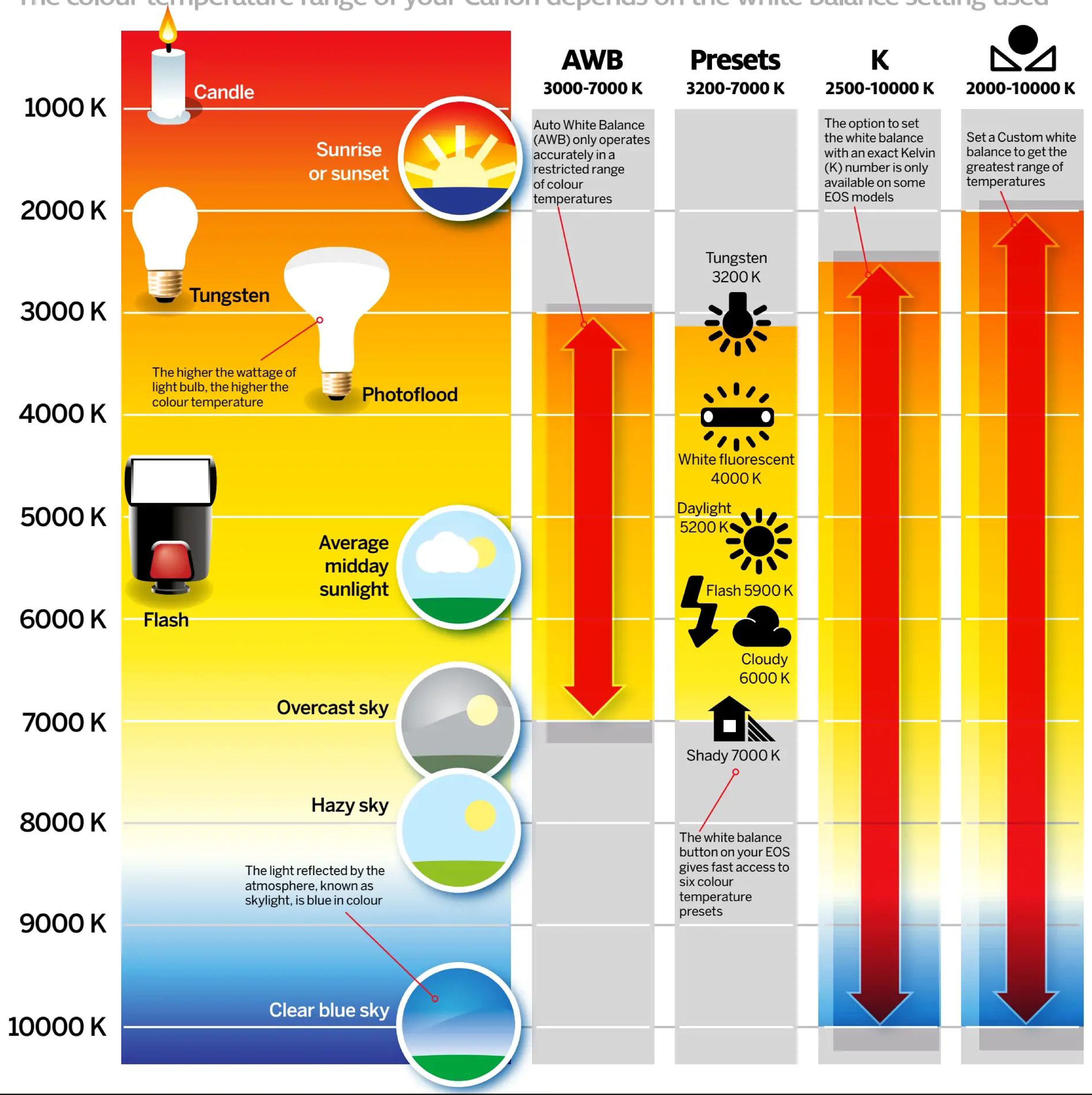
This AWB setting does a surprisingly good job of getting the colour of your shots right in most lighting situations. However, as with all your camera's automatic settings, it's not foolproof. Most importantly, it can only operate within a confined range of colour temperatures. Colour temperature is measured on the Kelvin (K) scale, and the AWB system can only adjust from around 3000 to 7000 K. It will struggle to get a picture that does not look all-over orange when shooting in your front room at night, or when photographing a floodlit building (as the colour temperature of these light sources is lower). It will similarly struggle just before dawn or on a foggy day, when the light is blue-toned and requires a colour temperature higher than 7000 K if you want to avoid blue-rinsed imagery.

Your DSLR, therefore, has a number of manual white balance options that allow you to take full control. The easiest to access are the presets. These typically give half a dozen different settings designed specifically for different light sources – each represented by an appropriate symbol. A lightning bolt is used for flash lighting (5900 K). A light bulb is used for tungsten-filament bulb lighting (setting a colour temperature of 3200 K). For daylight, there are three options. The colour of daylight varies as it is always a mixture of direct sunlight and reflected skylight (light reflected

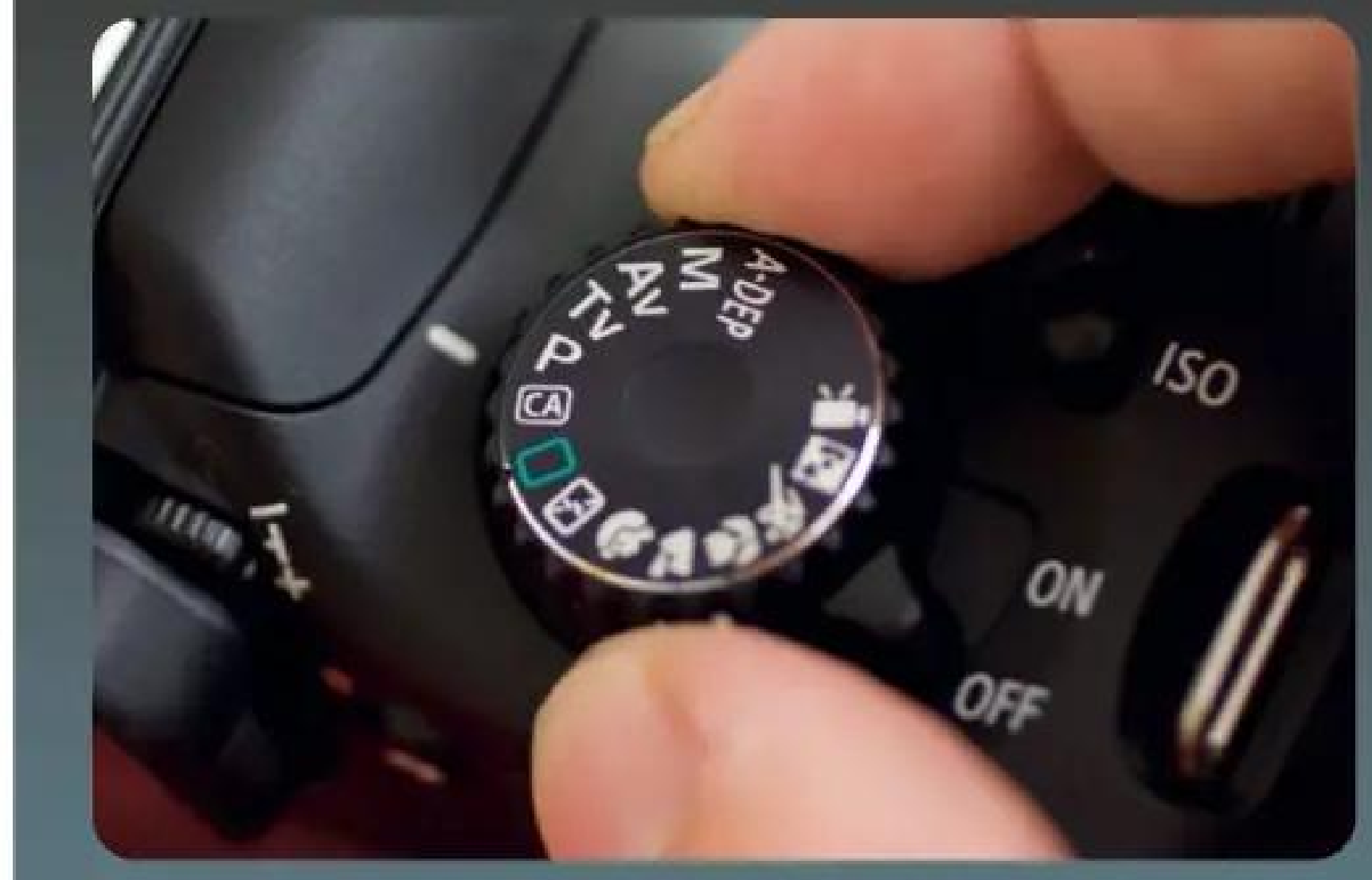
▶

Colour temperature and the Kelvin scale

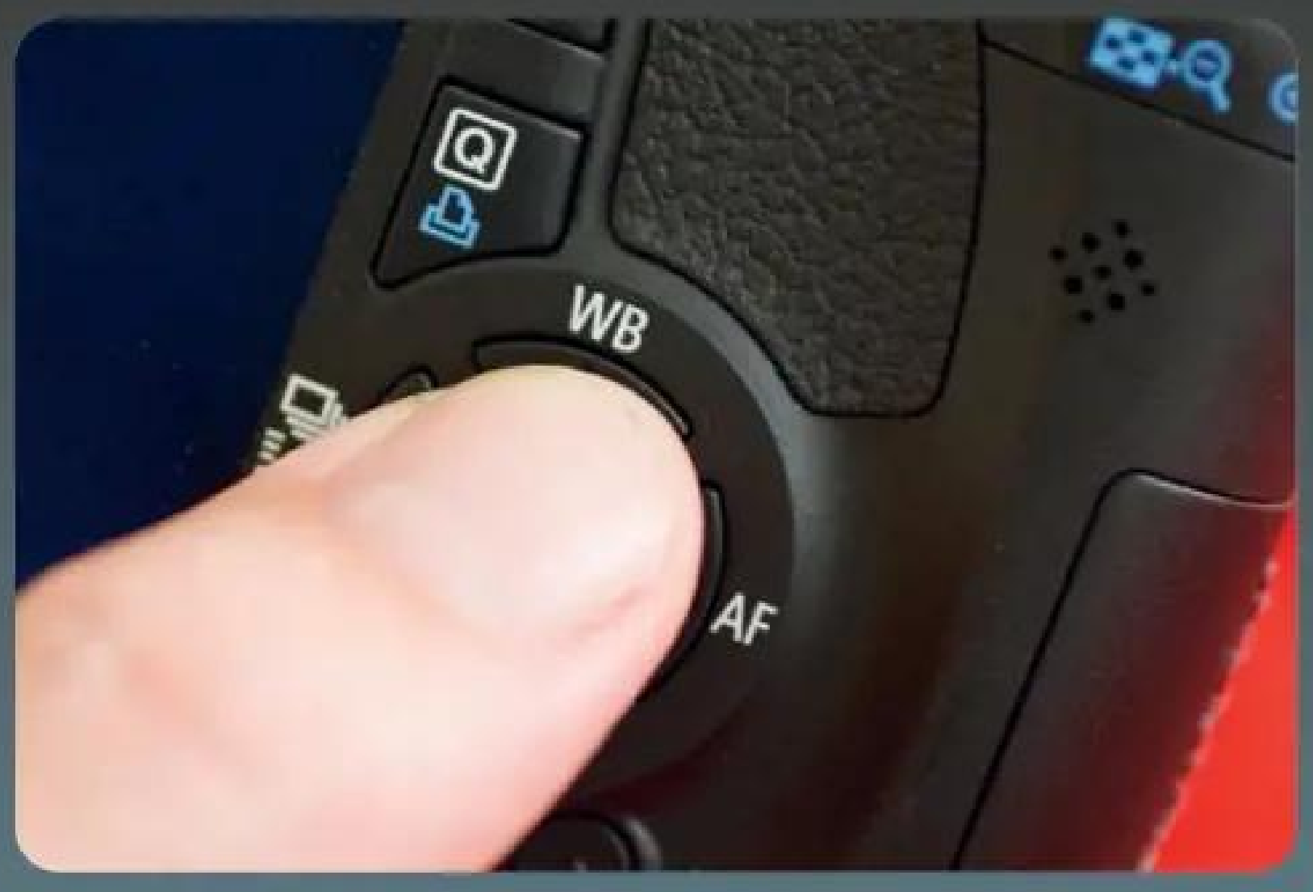
The colour temperature range of your Canon depends on the white balance setting used



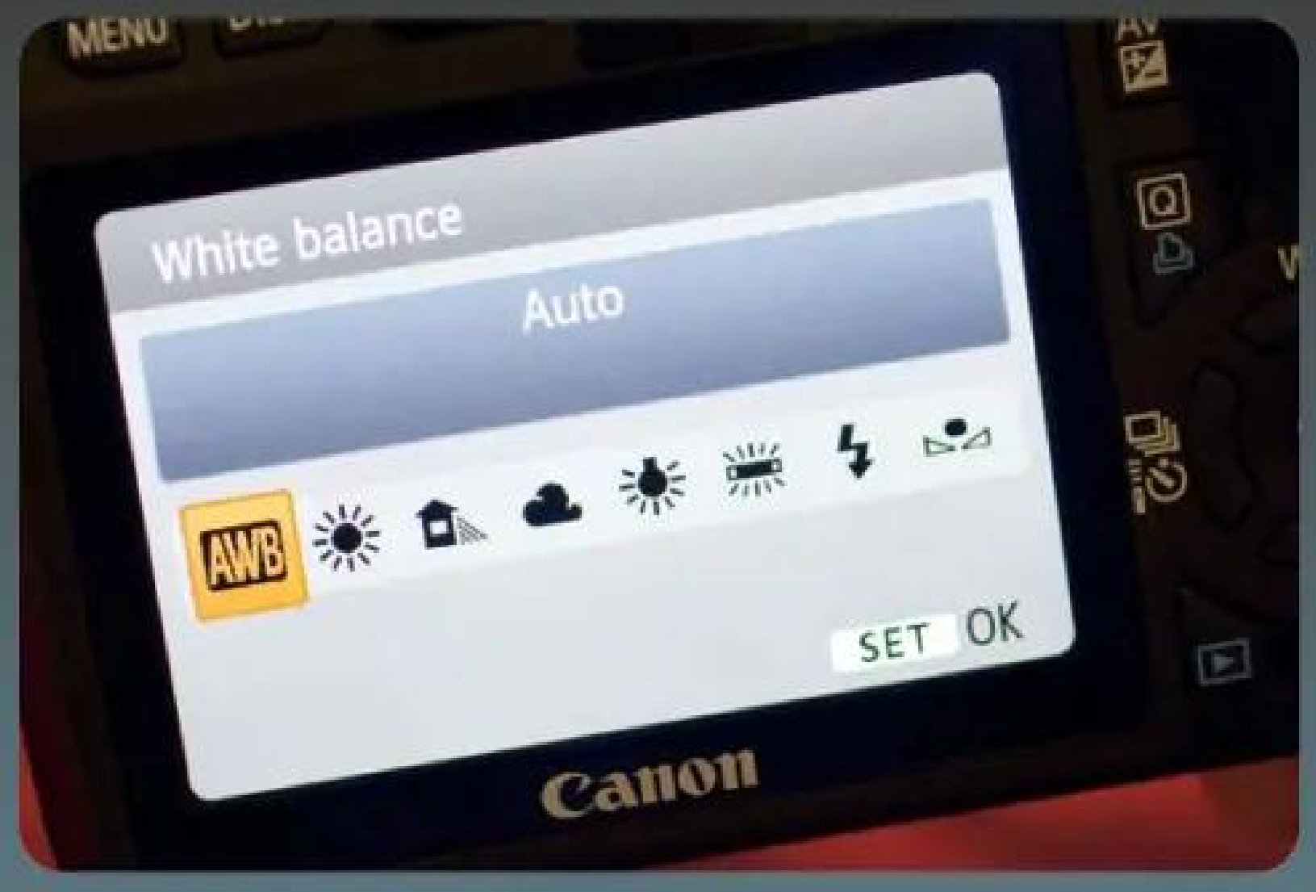
STEP BY STEP How to take control of white balance



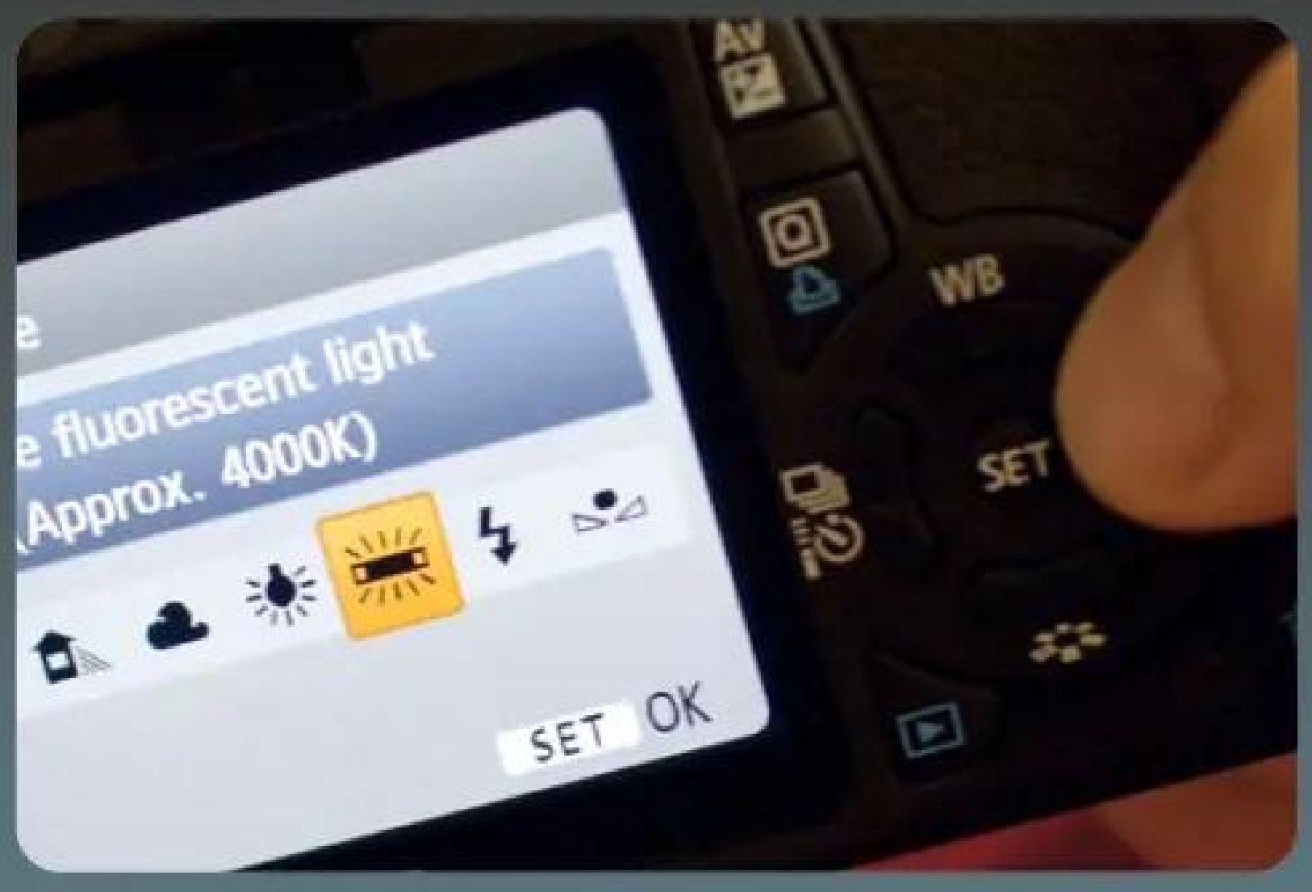
1 To override white balance, you need to be in a Creative mode, such as P, Tv, Av or M.



2 Press the WB (White Balance) button, which you'll find on the top or back of your camera.


White balance
Auto
AWB
SET OK
Canon

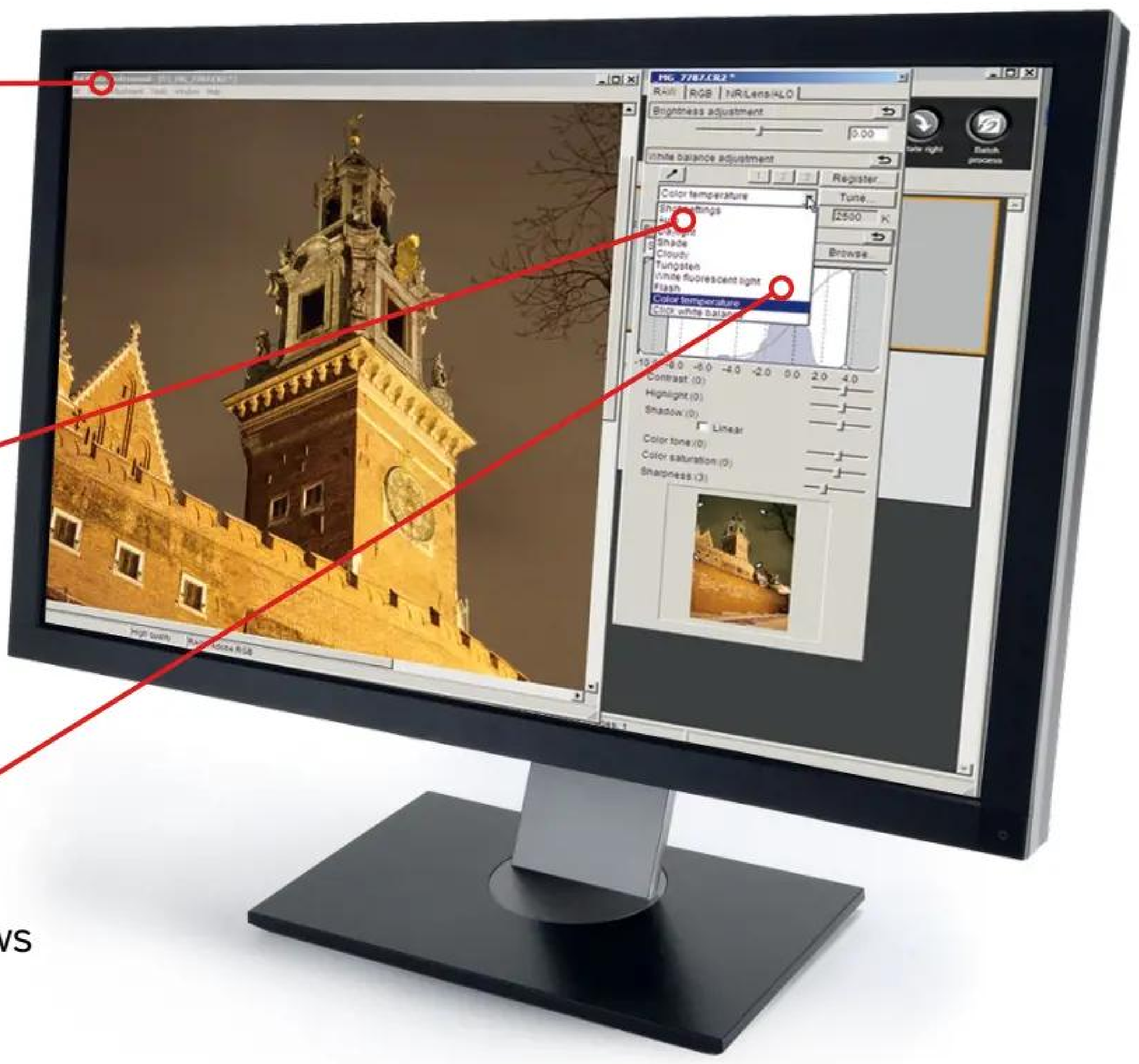
3 Your EOS comes set to AWB (Auto White Balance) mode, but there are several other options.


e fluorescent light
Approx. 4000K)
SET OK
WB
SET

4 Use cursor keys or wheel to access the manual options. You may also need to press Set.

Taking the RAW advantage

Shoot RAW and you can edit white balance later



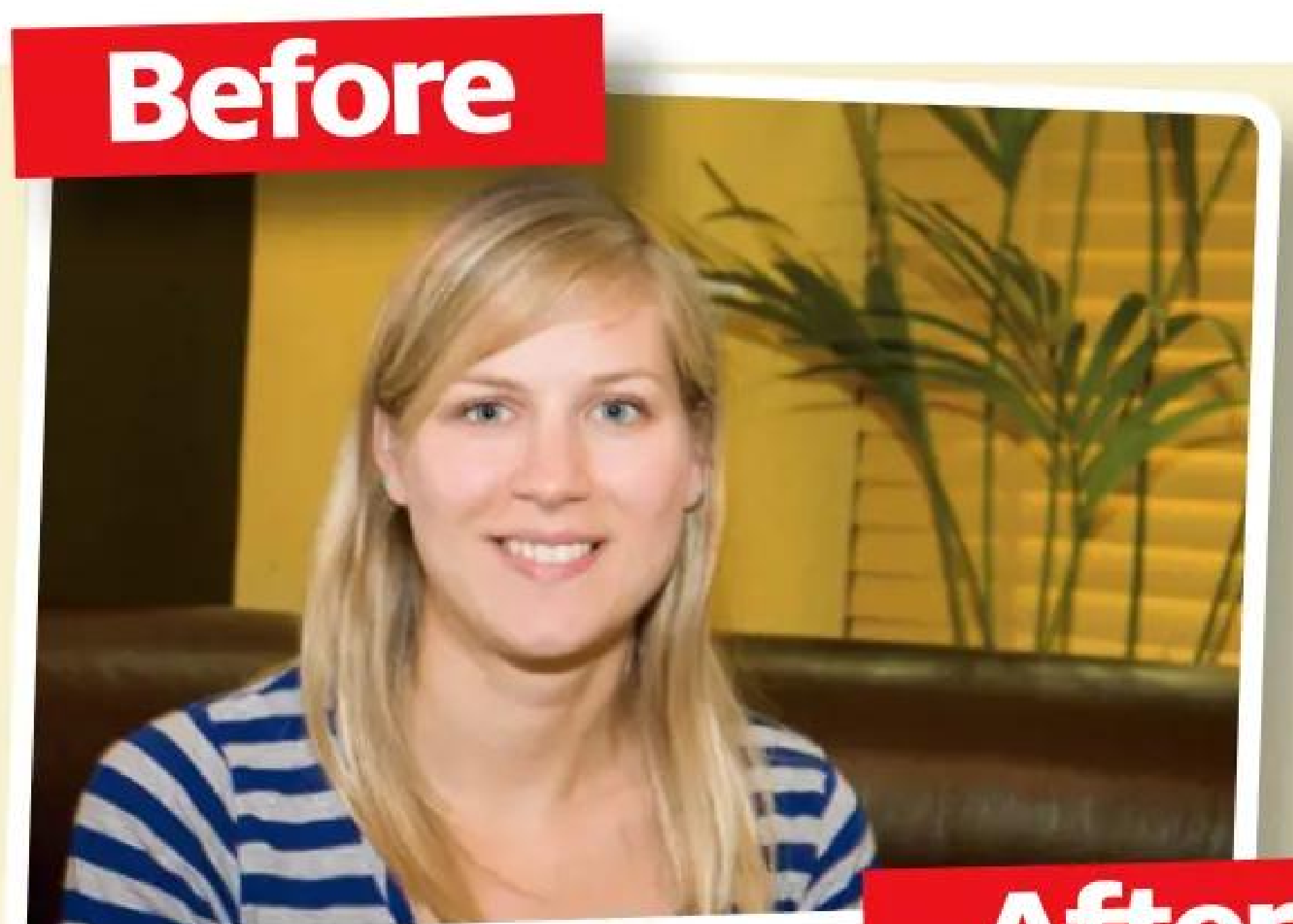
Software options
All RAW-editing programs allow you to alter white balance settings as you process the file. Canon's Digital Photo Professional does the job and comes free with your EOS SLR.

Preset menu
A drop-down menu allows you to tweak colour temperature in the same way as on your SLR.

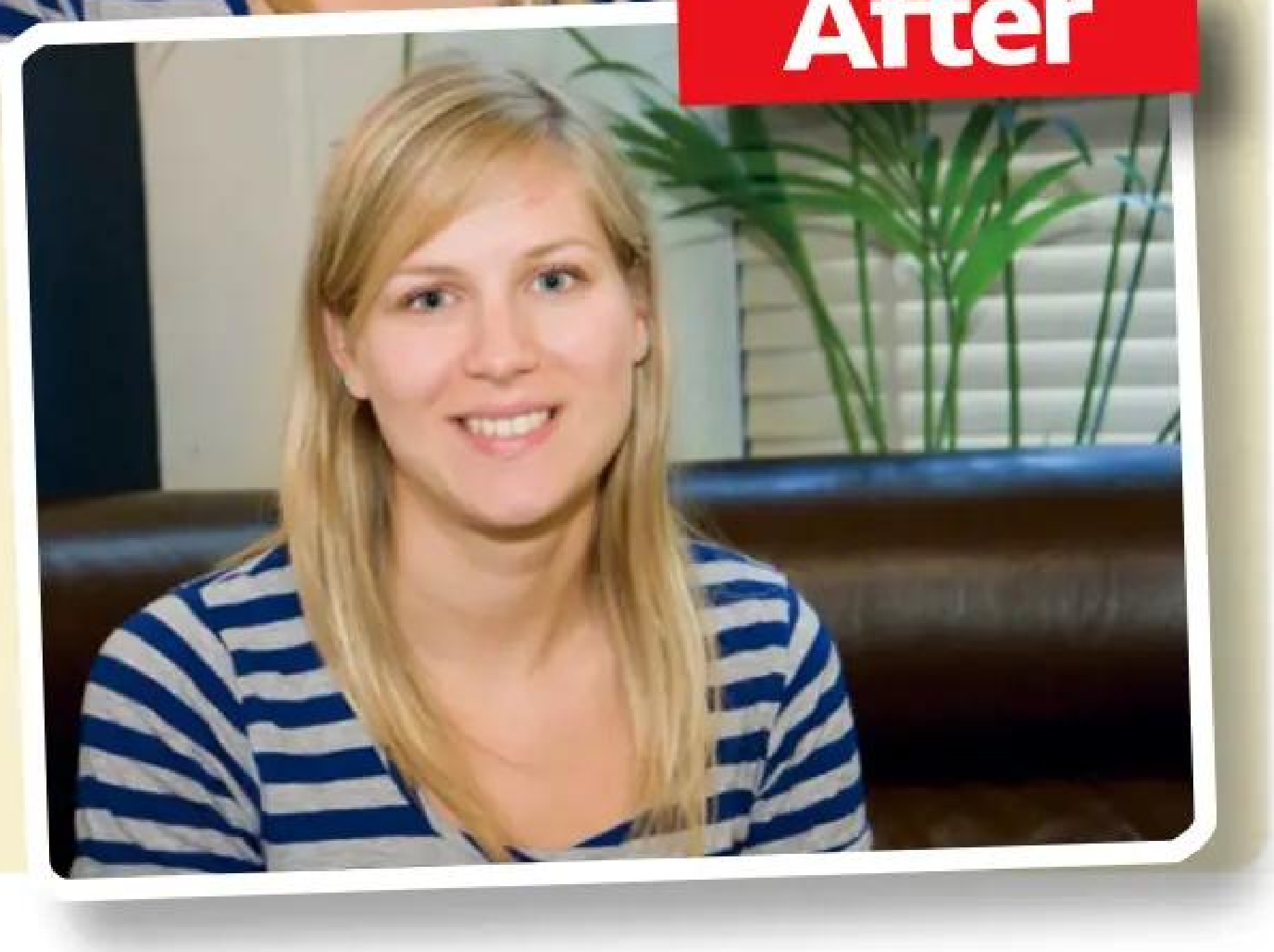
Precise temperature
DPP's Colour Temperature option allows you to set any Kelvin value you like.

Mixed lighting

Back in the days of film, colour temperature was adjusted using correction filters as the picture was printed (or on the lens, if using slide film). Filters are still used to correct colour in digital photography when shooting with two different light sources (known as 'mixed lighting'). When using flash in low light, for instance, the white balance cannot be adjusted for both the flash and the ambient light – typically creating a peculiar orange-coloured background. By putting an orange filter (known as a gel) over the front of the flash, the colour of both light sources can be made similar, creating a more natural-looking result.



Before



After

back off the atmosphere, which is bluer in tone). On a sunny day, skylight is less dominant, so the sun symbol gives an 'average daylight' colour temperature of 5200 K. The cloudy and shady options, meanwhile, give filtration for slightly bluer daylight conditions (with colour temperatures of 6000 K and 7000 K respectively). These setting are useful for getting consistent colours within a sequence of pictures – or for tricking the camera into giving you slightly warmer- or colder-looking results. However, the range of options is as restricted as when using AWB.

K is for Kelvin

For a greater range of colour temperature settings you need to use another manual option. Although not found on all EOS models, the K setting allows you to set a specific colour temperature by setting the Kelvin value you want. This is great for precision control – as you can dial in any setting from 2500 to 10000 K using the appropriate option in the main menu.

Of greater use, and available on all EOS models, is the Custom White Balance setting (see below). This gives an even greater range of colour temperatures (from 2000 K to 10000 K) – and this is set by taking a measurement from a test shot you have already taken of the scene.

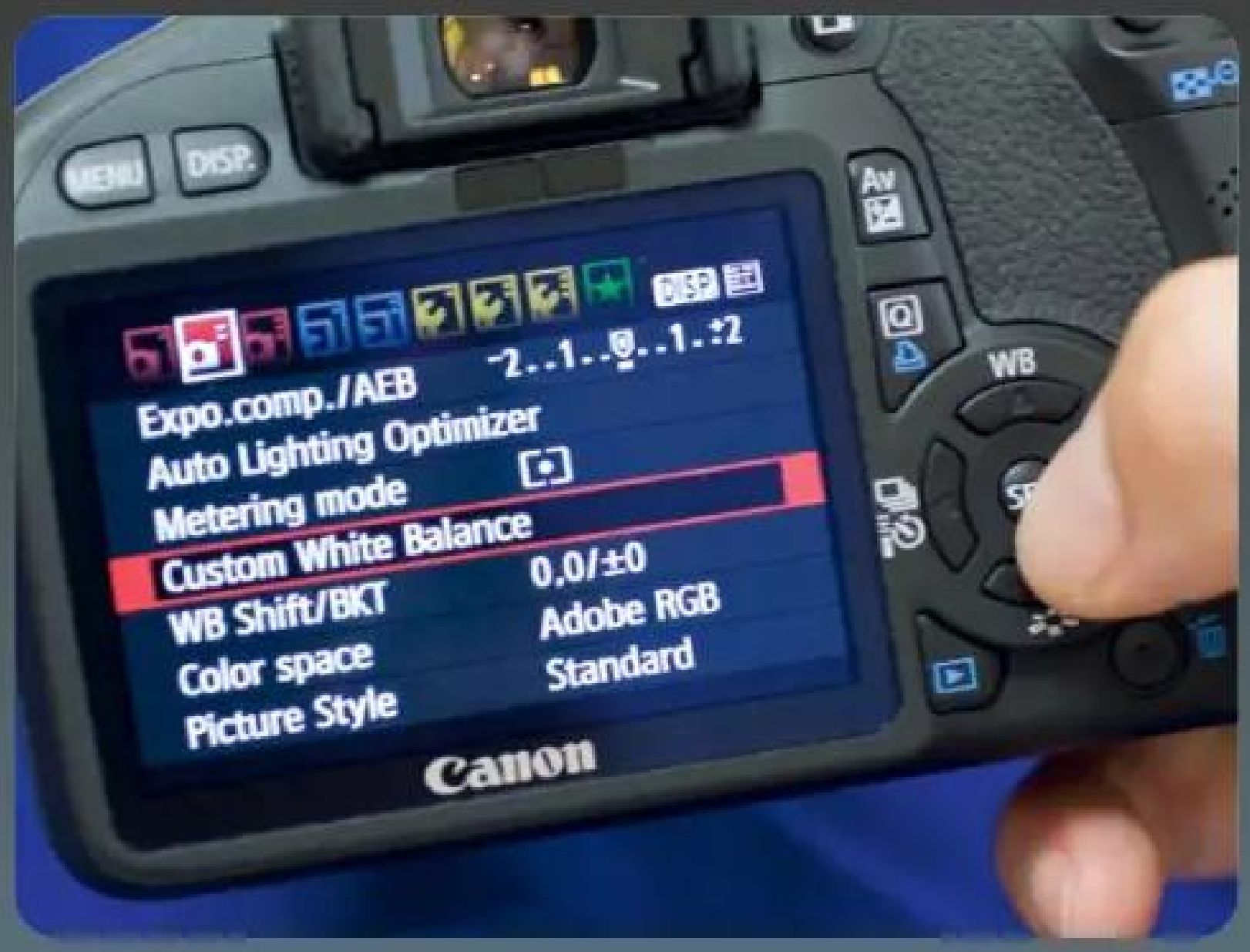
For accuracy, it is best to use a picture of a piece of white paper, or a specialist neutral-grey card, to set this. Just ensure this reference card is in the centre circle in the viewfinder, and in the same lighting as that you want to take final pictures. In reality (and not many people realise this) you can get good results with this system simply with a picture of the scene, without the complication of including the test card.

Why bother in RAW?

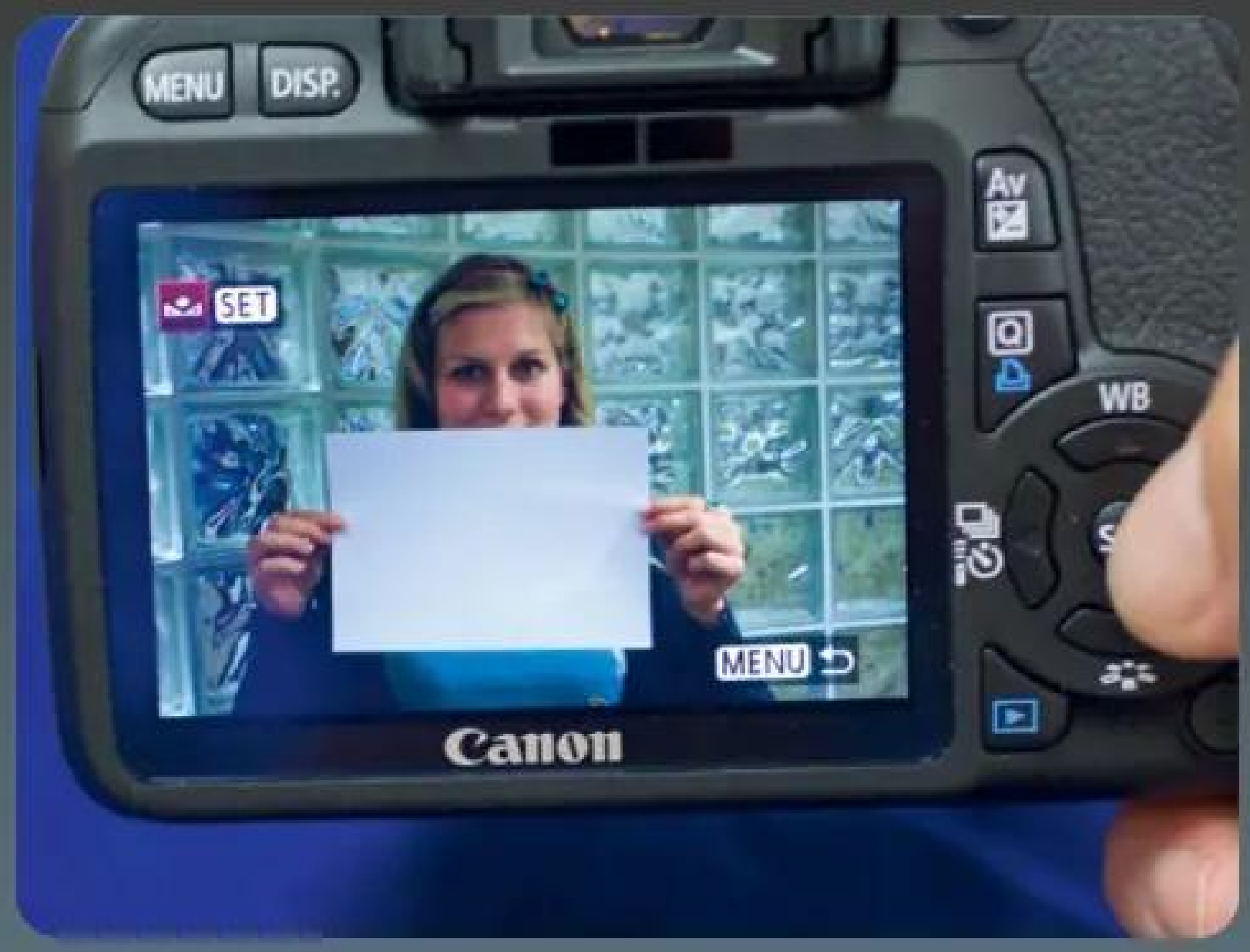
The white balance that you use is not set in stone. The colour of your shots can easily be changed at the editing stage to compensate for inaccuracies. In fact, if you set the file format (using the Quality

STEP BY STEP How to set a custom white balance

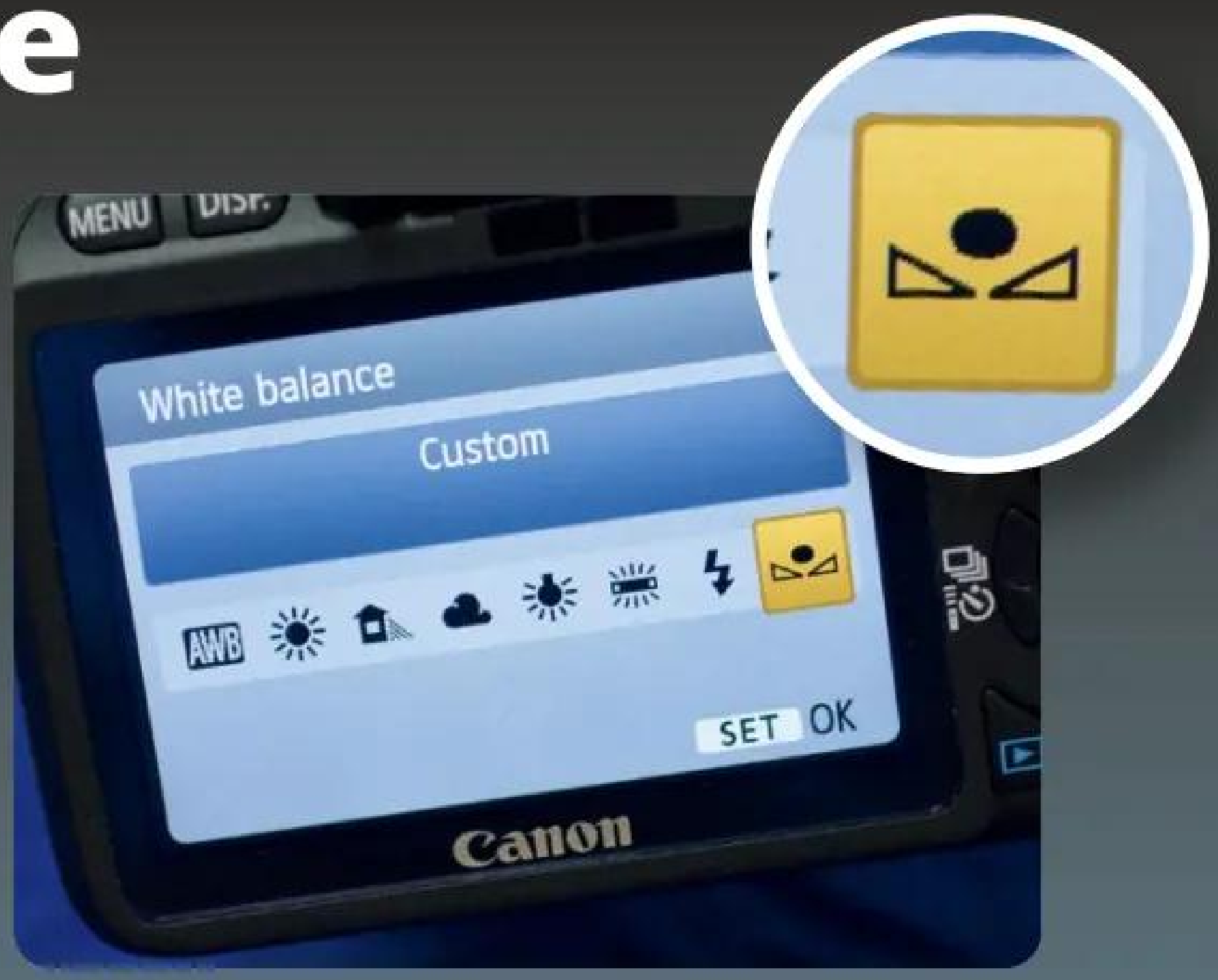
1 Take a shot in the lighting you want to adjust for. A piece of white paper (or special grey card) held in the centre of the frame ensures accuracy.



2 Press the Menu button and search for the Custom White Balance option (under the second tab on recent models). Now press the Set button.



3 The reference picture you have just shot is now shown on screen (you can scroll through to other shots if necessary). Now press Set.



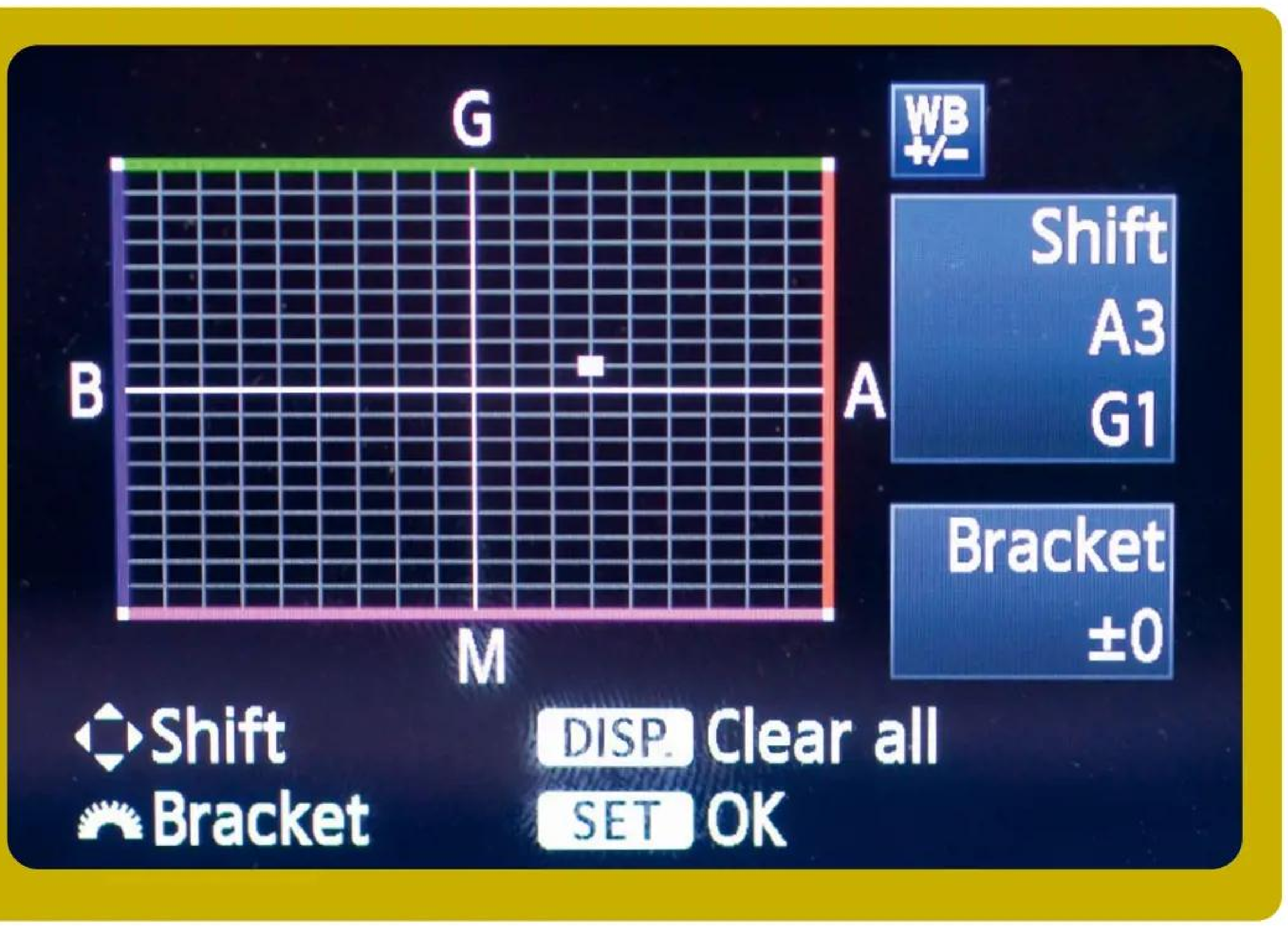
4 Your new custom white balance is now created. To use this, set the white balance mode to the flower-like Custom White Balance option.

option in the menu system to RAW (or the sRAW available on some EOS models) you can easily alter the white balance after you have taken the picture (see opposite), and without any image degradation.

You could therefore argue that those shooting in RAW need not worry at all about white balance settings – as it can all be fixed in post-production. One good reason for taking white balance seriously, even if shooting RAW, is that the pictures displayed on your camera's back LCD are actually shown with the white balance as set on the camera. If you want your pictures to look at their best as our review them, and show them to others on the screen, it makes sense to try and get the white balance correct as you take the picture! ■

SHIFT THE BALANCE

The WB Shift/Bracket menu option allows you to fine-tune your white balance, shifting colours towards blue or red, and towards green and magenta. Great for getting slightly warmer shots, say, when using AWB. A Bracket option even allows you to take three shots at slightly different colour temperatures.



Shift A3 G1

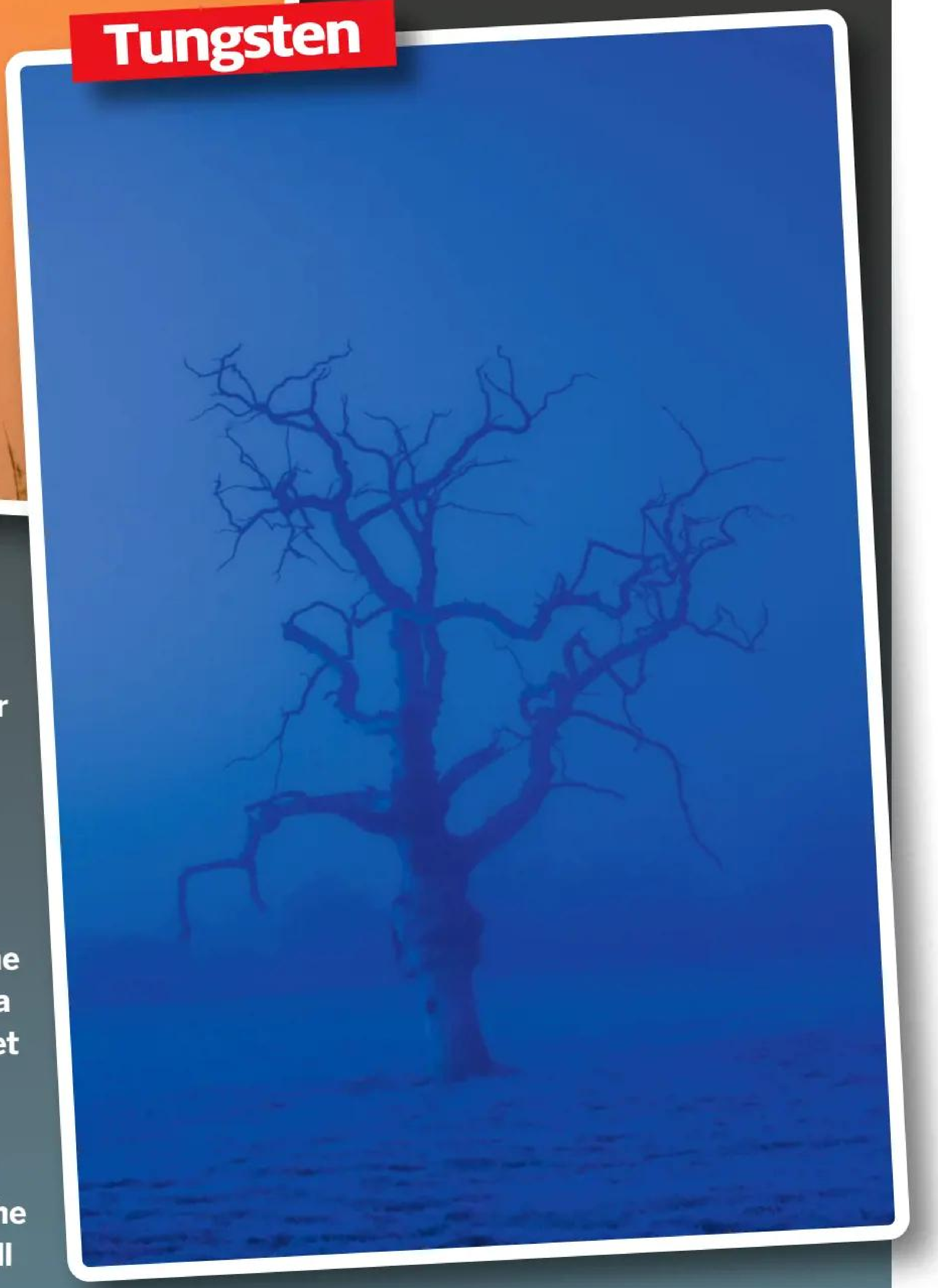
Bracket ±0

YOUR ASSIGNMENT! Get creative with white balance

It is not always necessary to get your white balance 100% accurate at the time of shooting. And this is not just because it is possible tweak colours at the editing stage (particularly if you are shooting RAW). Getting the white balance 'wrong' can often actually help your picture taking. Here are three great white balance tricks to try for this lesson's homework!

1 Find a suitable outdoor subject lit with normal daylight on a bright day. But rather than setting the white balance to AWB or Sunny, try setting it to Cloudy instead. This will make the picture warmer in tone, and can be a great trick when photographing portraits or architecture.

Get the white balance 'wrong' to increase the colour in your shots!



2 Sunsets often look rather less impressive in photographs than you remembered when taking them. Cheating with white balance can make dusk and dawn look more golden. Set the WB to Shade, or if your camera allows, use the K option and set a temperature of 10000 K.

3 Give your landscapes a moonlit look by setting the white balance to give an overall blue tone. Set the WB to Tungsten, or set a K value of 2500 K. Alternatively, use the Custom White Balance option (see left) and, rather than using a piece of white paper, use a piece of orange or red paper for your test card. This will trick your camera into giving you a blue-toned picture. The same trick works well for ghostly Halloween portraits.

5 Now take your actual shot using this bespoke white balance setting. Remember to change the setting for your next setup, or if the lighting changes.

LESSON 9

What is digital processing about?

When magnified, every digital picture is a mosaic of squares – each of which can typically be any one of 16.7 million colours! But to create this rainbow palette takes lots of computer processing as each individual pixel on your camera is colour blind!

Chris George

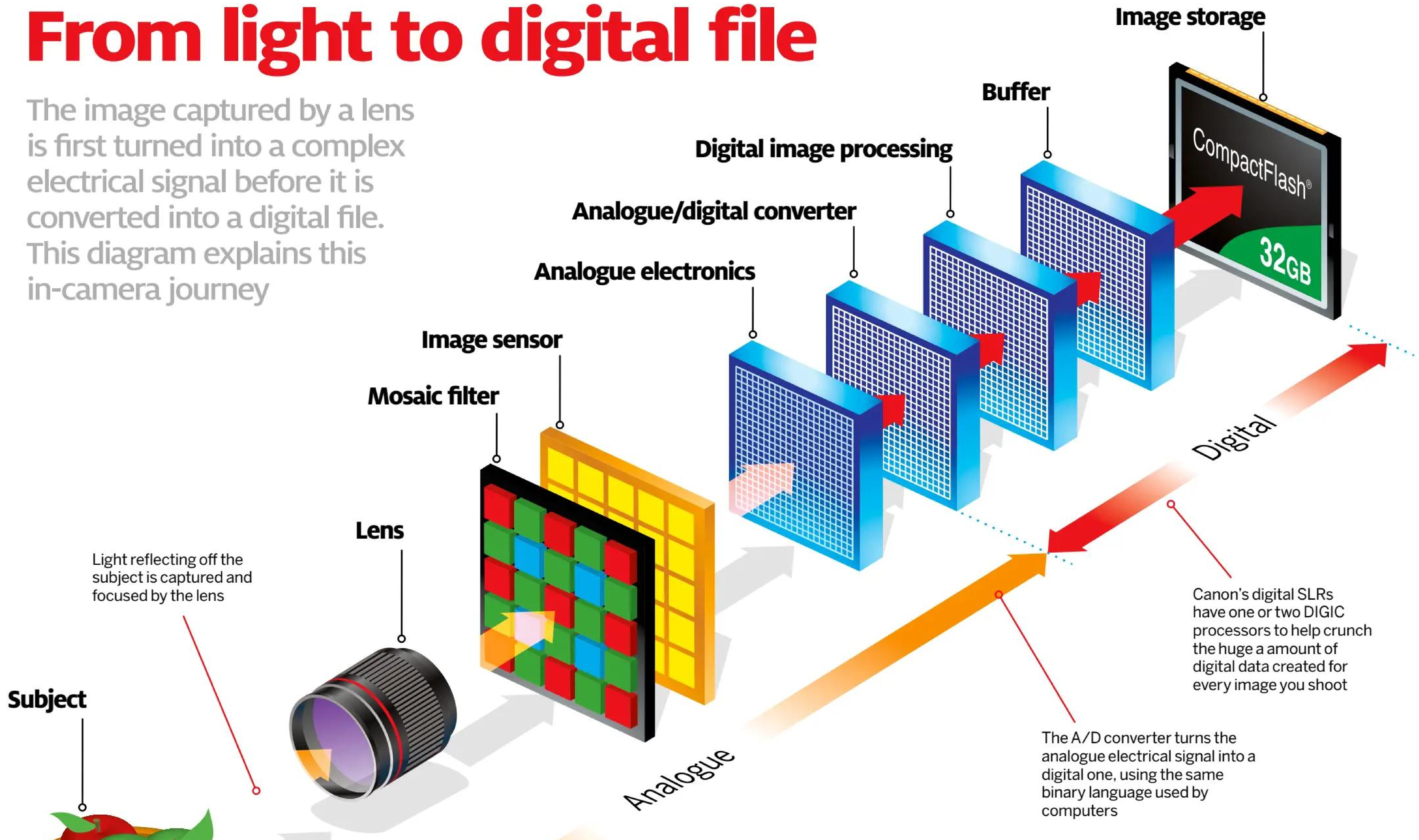
Your digital camera does a lot more work to turn what you see in the viewfinder into a finished image than you probably give it credit for. The lens creates an image on the SLR's CMOS sensor – which ends up being recorded in digital form on the memory card that you slot into your EOS, that much may be obvious. But in between these two stages a lot of processing steps have to take place inside the camera. Understanding a little of what goes on deep inside your Canon's circuitry will not only help you understand what an amazingly sophisticated piece of kit you have – but can also explain some of the many options that you have to play with.

The first thing to appreciate is that your image is only converted into digital form well after it has left the sensor. The sensor itself is an analogue (non-digital) component, creating an old-fashioned analogue signal, and a certain amount of electronic circuitry is used to tweak this – allowing you to increase ISO, for instance, by amplifying the signal in much the same way as you crank up the volume on your radio – all before the digitisation process begins.

The sensor is made up of millions of light-sensitive units, often referred to as pixels, but at this stage more accurately called photosites. These can measure as little as 0.004mm across (around 1/16th of a width of a single human hair). Each creates its own electrical signal in proportion to the brightness of the part of the image that it covers. But these individual photosites cannot see colour – only luminance. To produce a full-colour image each photosite not only has its own miniature lens but also its own miniature coloured filter (either red, green or blue and laid out in a grid pattern – see right). A pixel with a green filter will only see colours that have some green light in them. But as practically all colours can be made by mixing red, green and blue light together, this still provides some valuable information. ▶

From light to digital file

The image captured by a lens is first turned into a complex electrical signal before it is converted into a digital file. This diagram explains this in-camera journey



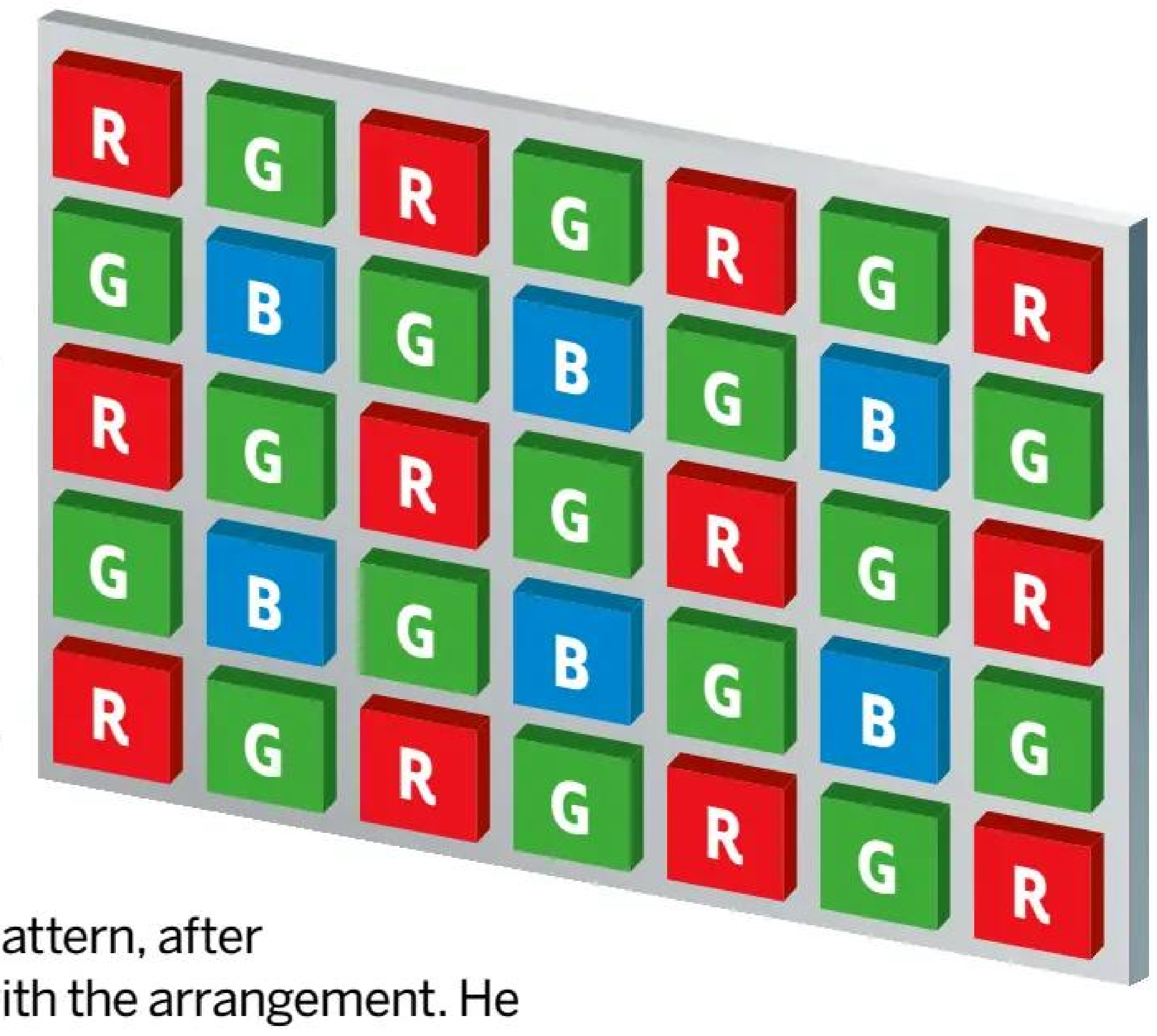
Light reflecting off the subject is captured and focused by the lens

Canon's digital SLRs have one or two DIGIC processors to help crunch the huge a amount of digital data created for every image you shoot

The A/D converter turns the analogue electrical signal into a digital one, using the same binary language used by computers

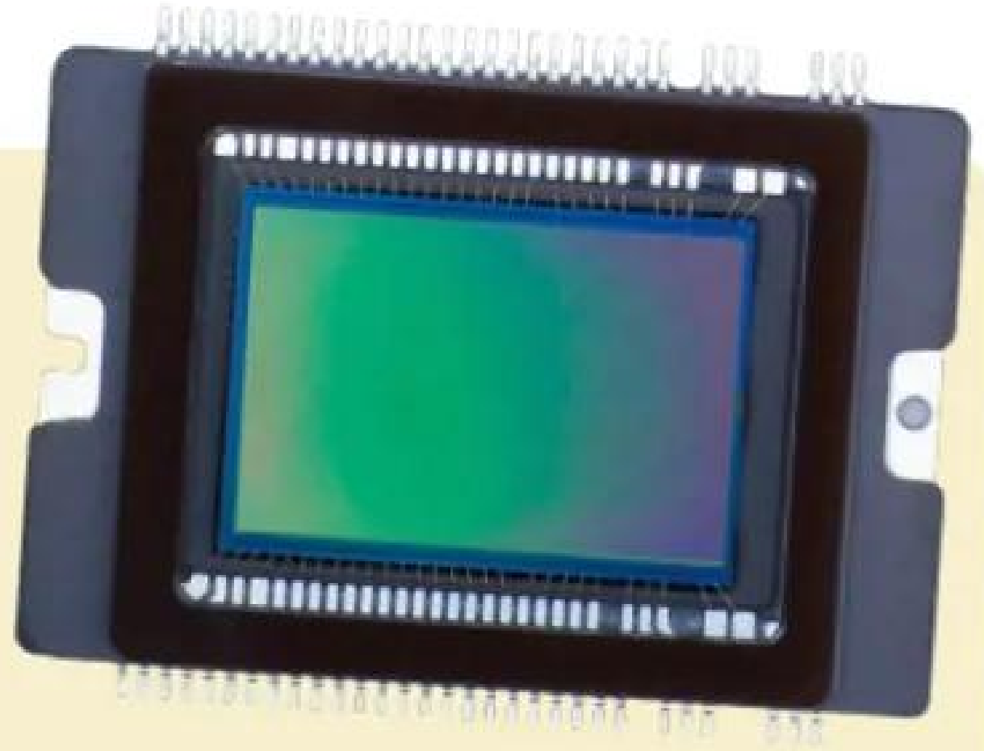
Although we use digital cameras, much of the image-taking process is non-digital or 'analogue'

The colour filter array



Each of the pixels or 'photosites' in the sensor can only measure the brightness of the light hitting it, not its colour. So that colour information is gathered, each photosite has either a red, green or blue filter. These are arranged in a mosaic known as Bayer pattern, after the boffin that came up with the arrangement. He discovered that by using twice as many green filters as blue or red you get a sharper image. A complex demosaicing process is used to turn the raw data from the array into the complex full-colour grid of pixels that are seen in the processed, recorded images.

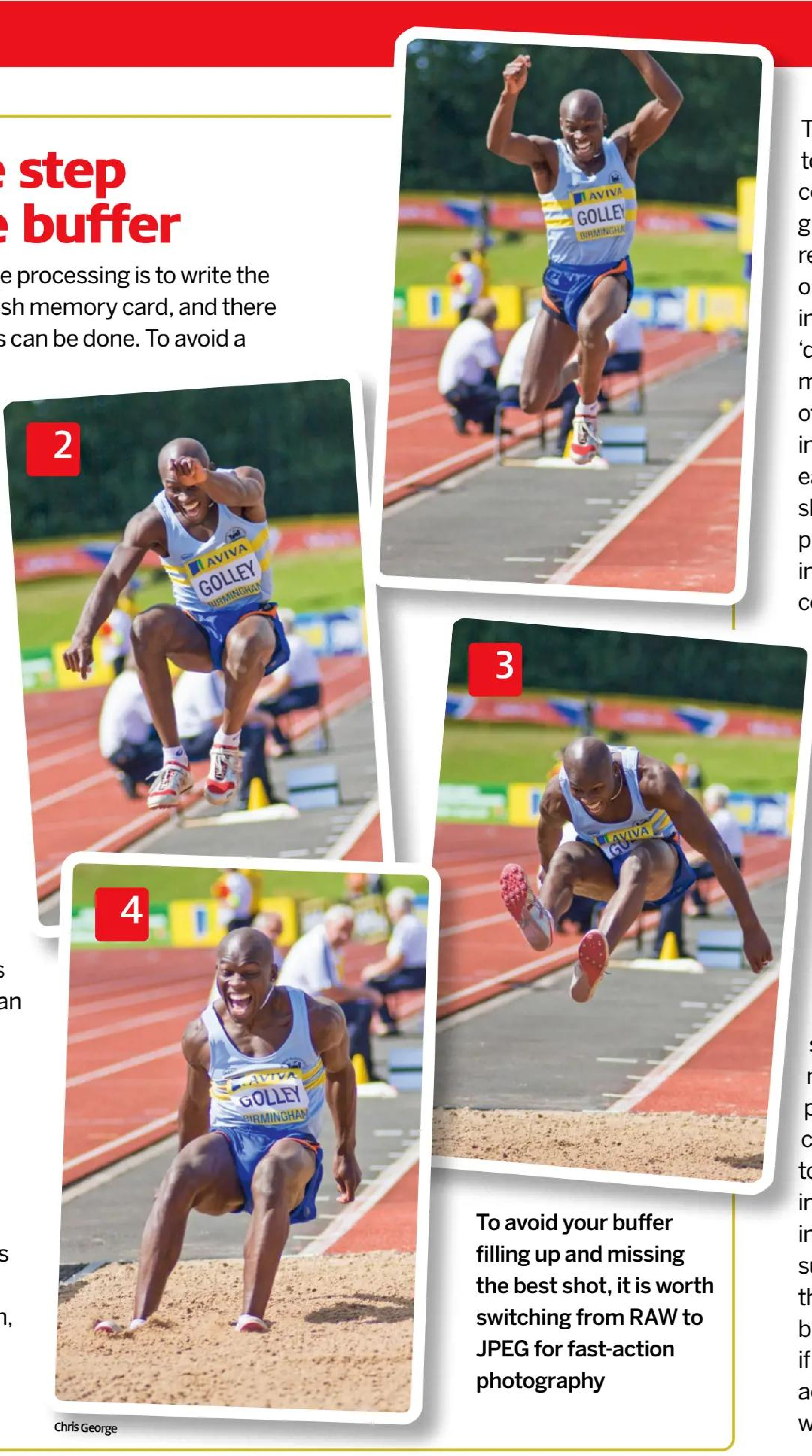
Moiré effect



Your Canon's CMOS sensor not only has a filter in front of each of the pixels (see left), it also has a filter covering the whole sensor area. This 'low-pass filter' is primarily designed to soften the image projected by the lens. Why is this necessary, you may well ask? Without this, the grid-like pattern of pixels in the sensor would regularly create interference patterns when photographing subjects that themselves have fine grid-like patterns. You can occasionally still see the resulting ripple-like 'moiré' effect when viewing fine-weave fabrics on screen at certain magnifications (as in the example on the right). The softening effect of the low-pass filter means that the image then needs to be electronically sharpened, either by the camera or on the computer.

Keeping one step ahead of the buffer

The last step in the digital image processing is to write the data to your SD or CompactFlash memory card, and there is a maximum rate at which this can be done. To avoid a bottleneck and to ensure data is not lost, the camera has its own 'buffer' memory – a temporary storage area that acts like a reservoir that keeps your data steadily flowing onto the memory card. The size of the buffer memory varies significantly from model to model – but it is easy for it to start filling up if you take a lot of pictures in rapid succession. A number of indicators (see below) keep you informed as to whether the buffer is being used and how full it is getting. If you are shooting a high-speed motor drive sequence, however, or a sustained sequence of pictures at a wedding (say), the buffer can get completely full – and the camera will refuse to take any more pictures until the file writing system has caught up. The number of RAW files you can take in quick succession typically varies from 4 to 28 – but with JPEG quality settings you will get a much longer sustained burst. For this reason, when shooting fast-action events like sport, it is worth using JPEG.



To avoid your buffer filling up and missing the best shot, it is worth switching from RAW to JPEG for fast-action photography

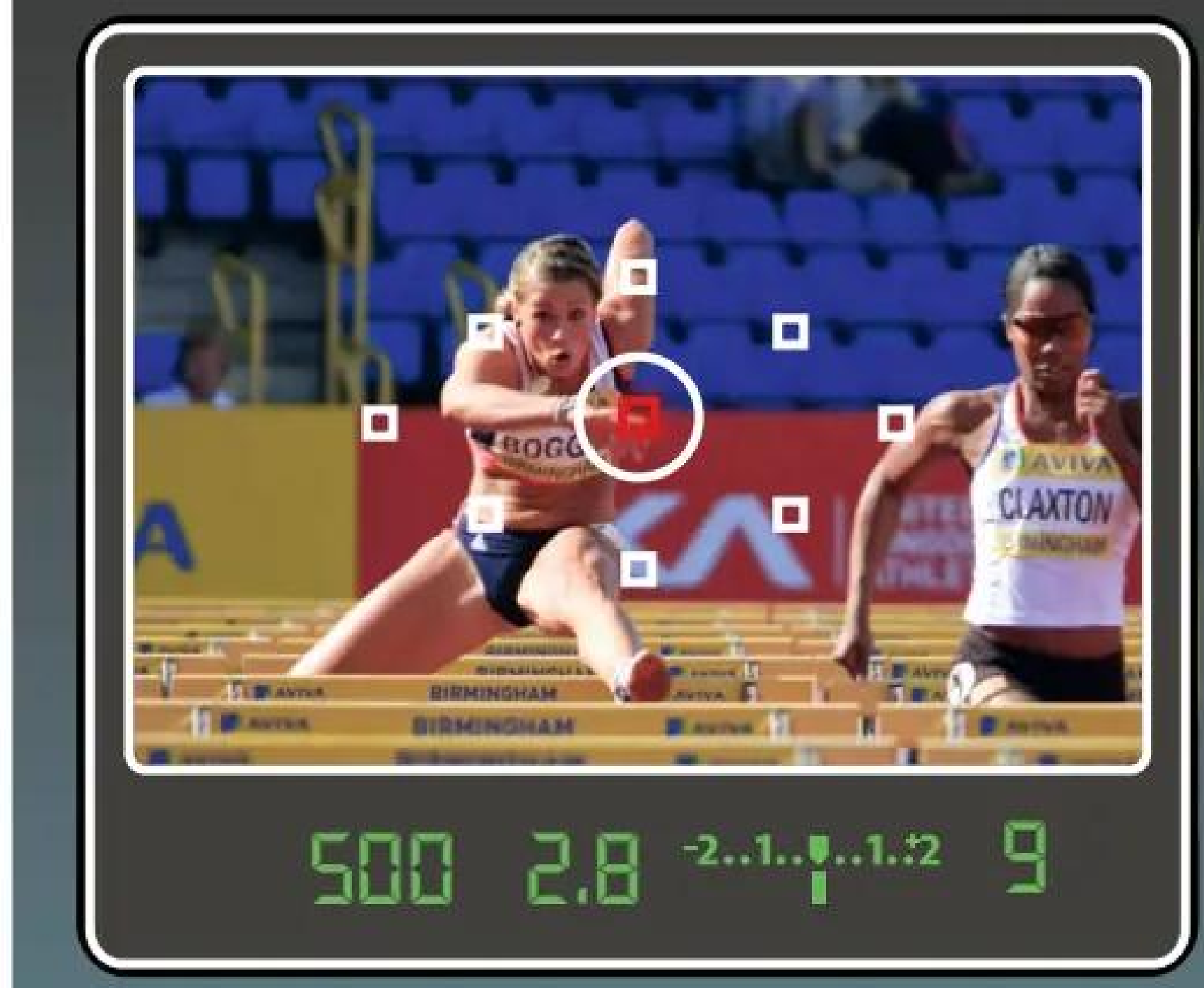
Chris George

The clever bit is how the pixels work together as a team to assign accurate colours to each pixel in the final image. The green-filtered photosite can effectively 'see' red light by comparing the information from one pixel with neighbouring pixels as the information is processed. Known as 'demosaicing', this interpolation process makes an informed guess as to the colour of each and every square that makes up the image. In fact, even with JPEG pictures, each photosite can register 256 different shades of brightness, which after processing creates an image with an incredible 16.7 million possible swatches of colour. RAW images, in which the demosaicing can be redone at the editing stage, offer even more colour detail. Canon EOS DSLRs offer either 4,096 or 16,384 brightness levels that can be recorded for each pixel – which translates into having either an incredible 68 billion or four trillion colour variations on offer!

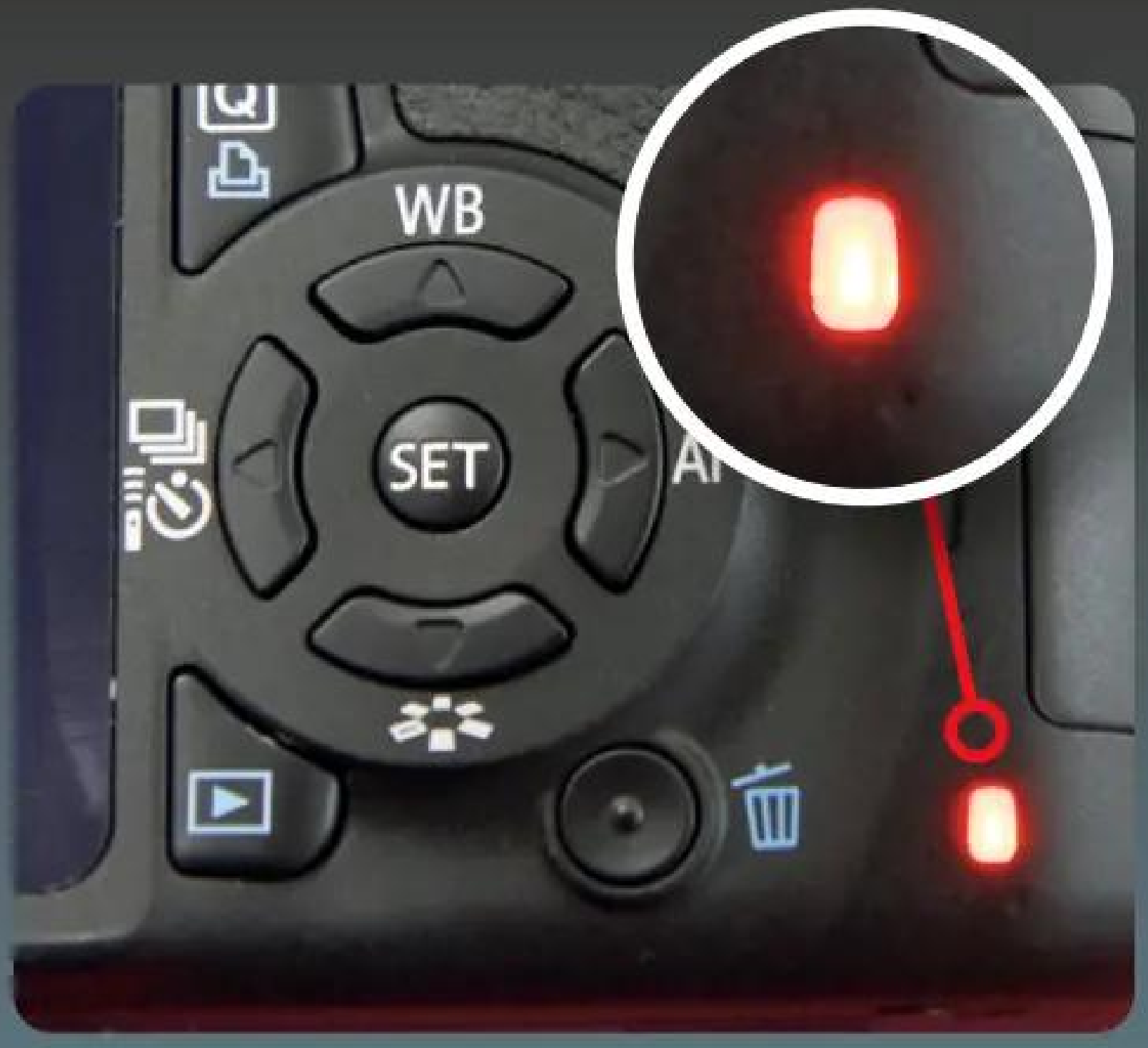
Processing power

The amount of computing power offered to handle the vast amounts of data produced by the sensor varies significantly from camera to camera. The more pixels in the sensor, the more processing you need – but unlike your computer, you can't upgrade components to gain extra speed. The ability to process images with minimal delay is much more important with some photographic subjects than it is with others. With sports, the processor needs to work fast and the buffer memory needs to be large (see left) if the camera is going to keep up with the action. The amount of processing power will affect just how many frames that you

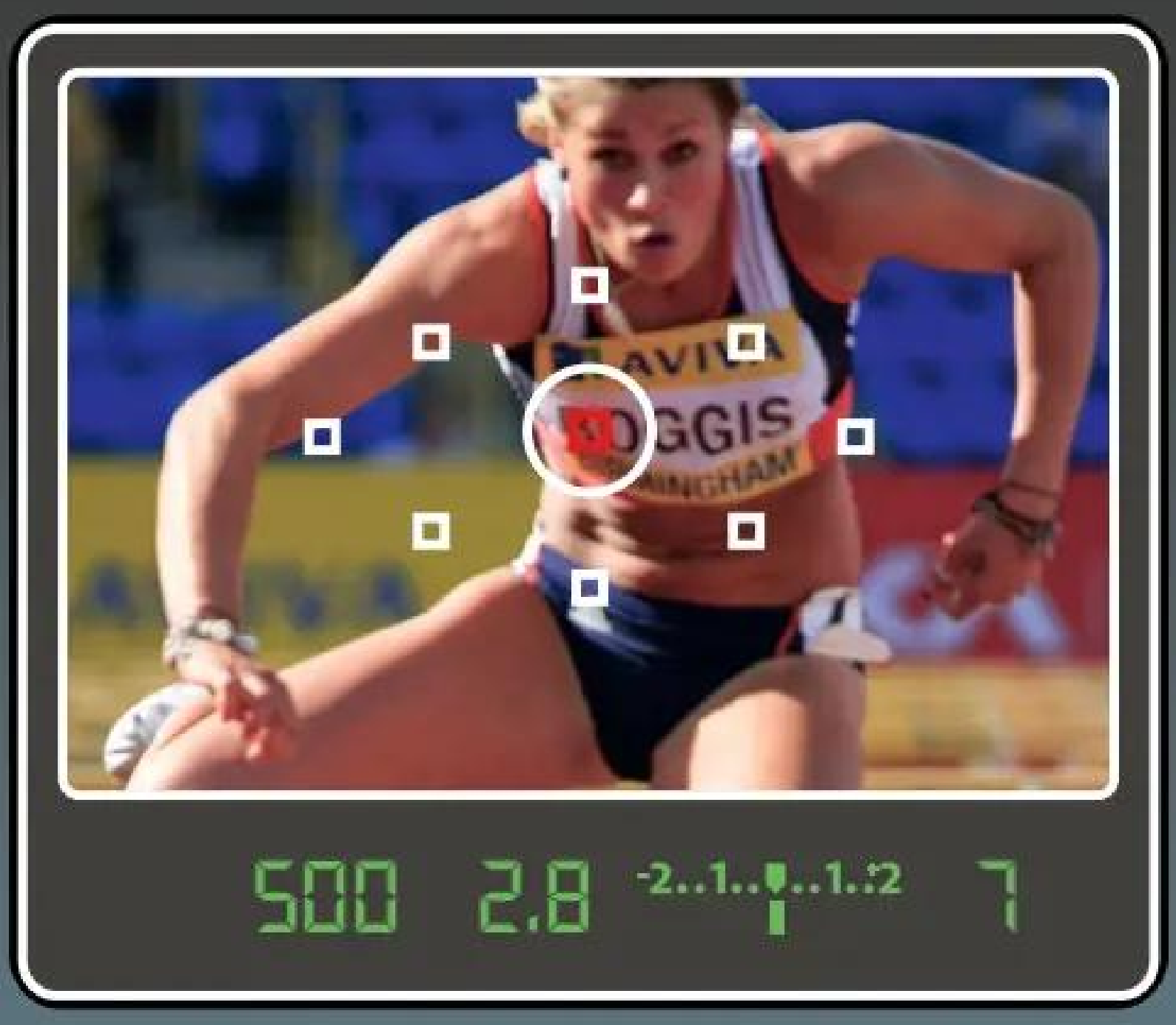
STEP BY STEP Find out how full your buffer is getting



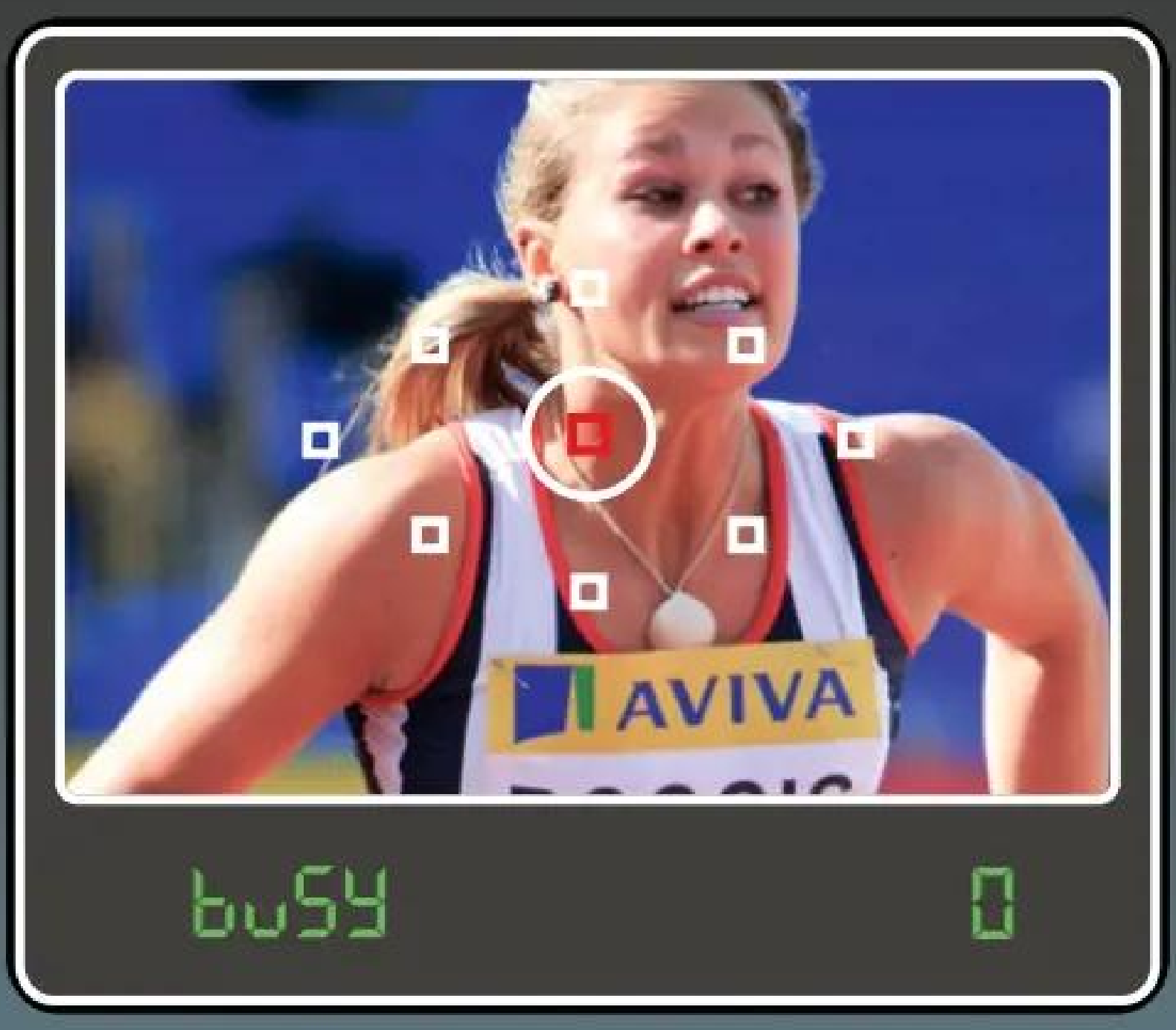
1 The digit on the far right in the viewfinder usually says 9, showing you can take at least nine shots before the buffer fills.



2 When you take a shot, a red LED comes on by the card door – this remains alight until the buffer memory clears.



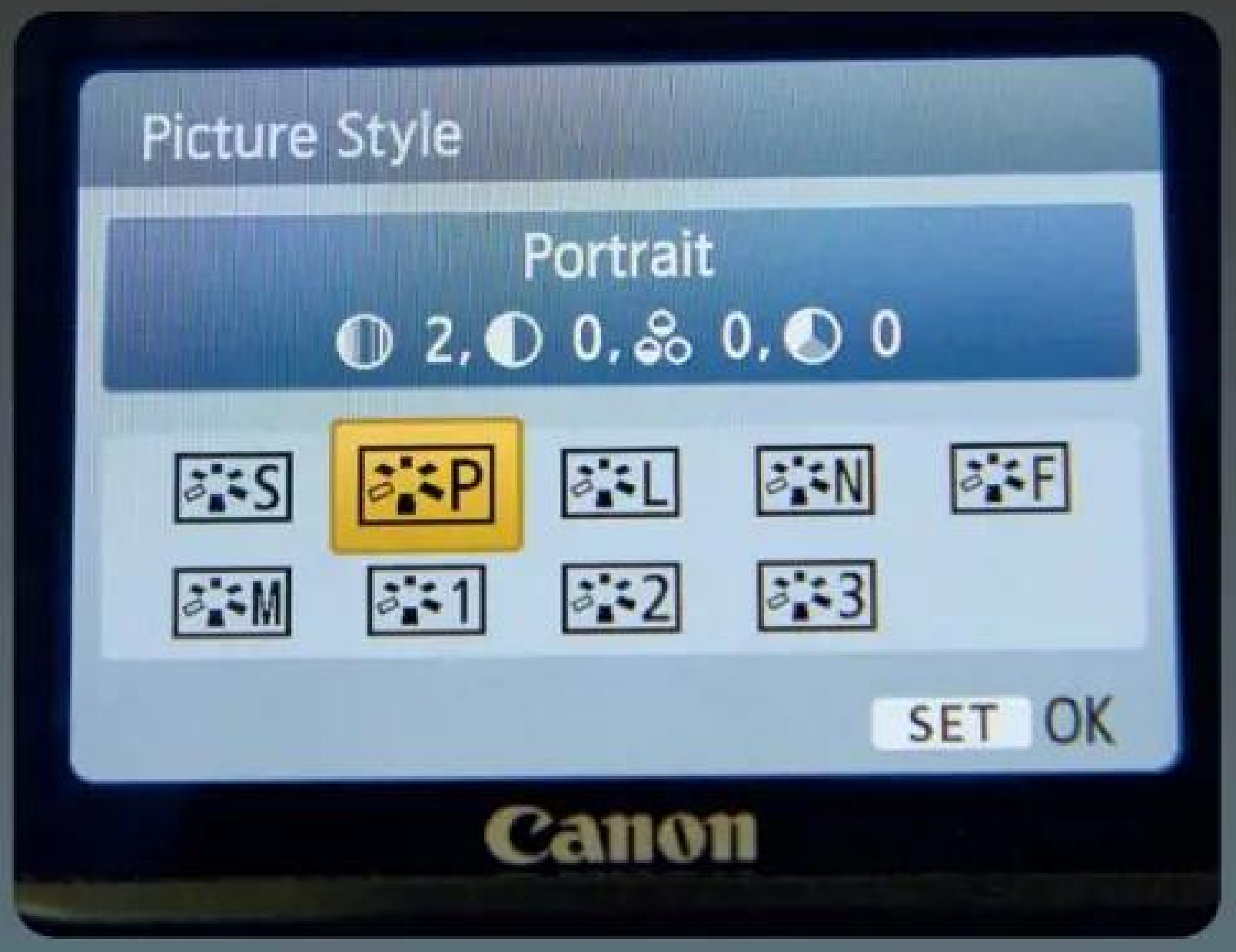
3 Watch the buffer counter in the viewfinder change, when taking lots of pictures in rapid succession.



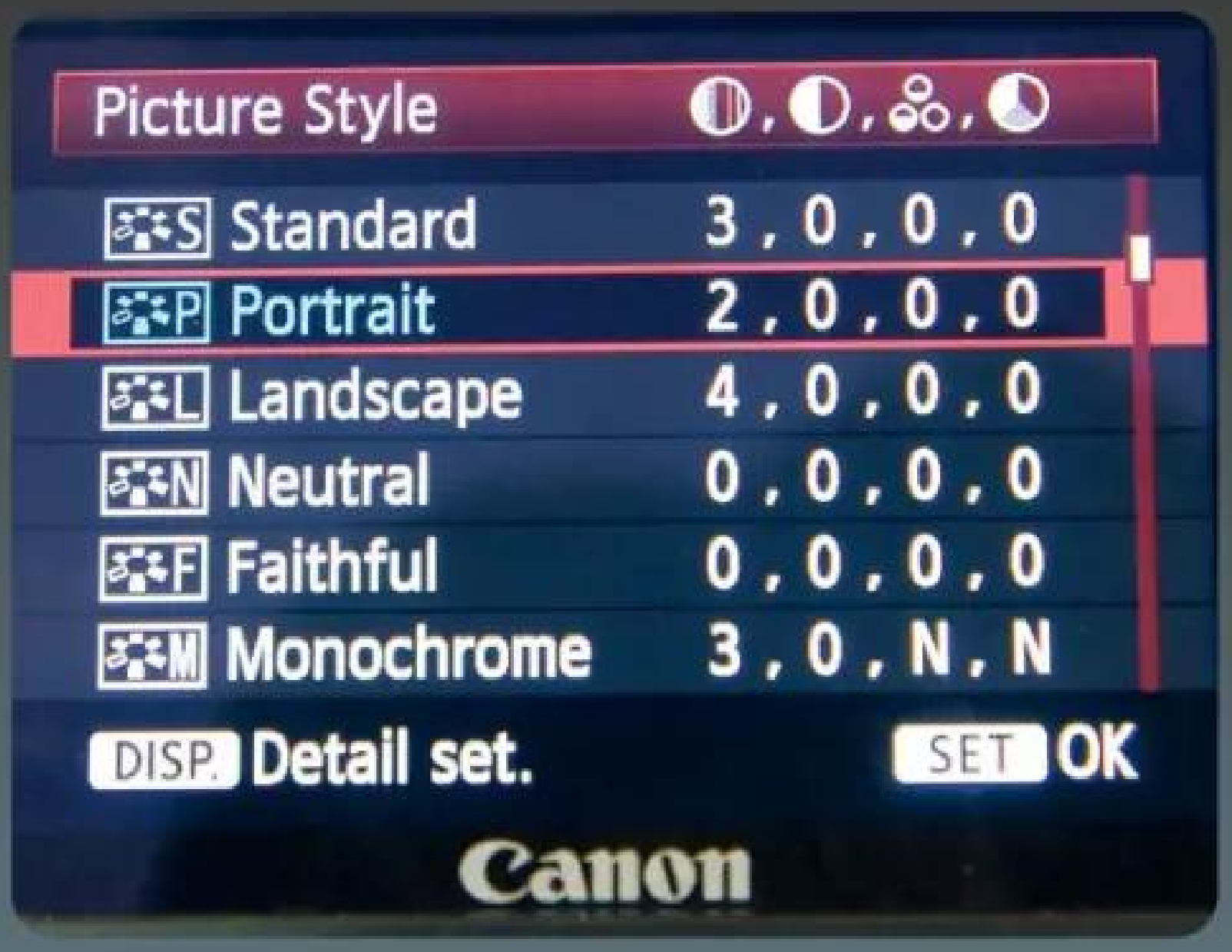
4 When the buffer counter reaches zero, you can't take any more pictures until there is some free buffer space.

STEP BY STEP How to change your Picture Style

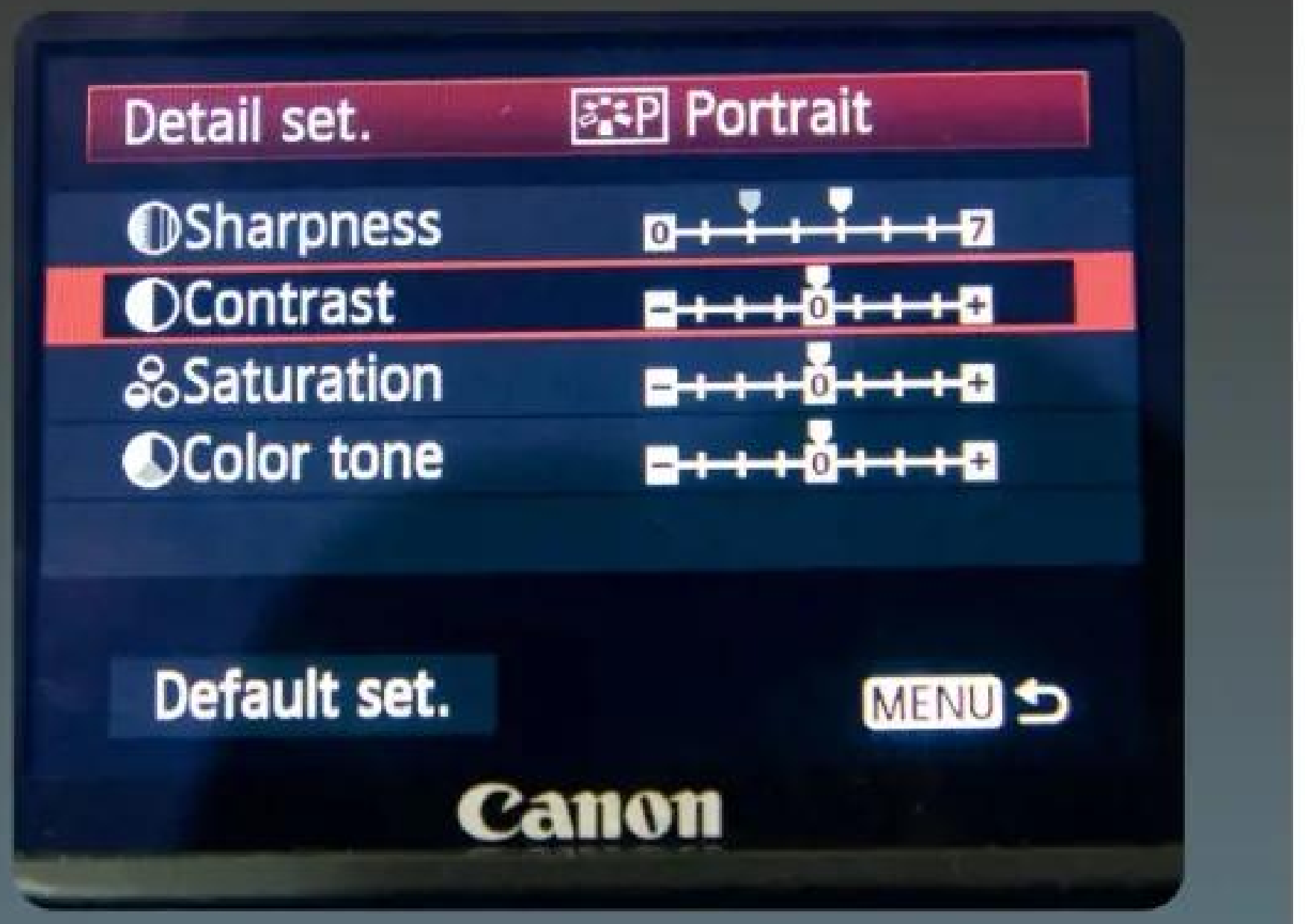
1 Change your Picture Style to get the colour and contrast you prefer. Press the button with the icon that looks a bit like a six-pointed star.


Picture Style
Portrait
◑ 2, ◐ 0, ஃ 0, ◔ 0
SET OK

2 You typically get six presets to choose from (P for Portrait, L for Landscape etc). Some cameras also offer extra custom settings as well.


Picture Style ◑, ◐, ஃ, ◔
Standard 3, 0, 0, 0
Portrait 2, 0, 0, 0
Landscape 4, 0, 0, 0
Neutral 0, 0, 0, 0
Faithful 0, 0, 0, 0
Monochrome 3, 0, N, N
DISP Detail set. SET OK

3 Each preset can also be tweaked to your own setting. Go to Picture Style in the main Menu, pick the Style you want to change, then press Disp.


Detail set. Portrait
Sharpness
Contrast
Saturation
Color tone
Default set. MENU

4 You can then set the Sharpness, Contrast, Saturation and the Colour Tone for this style to suit your pictures or to create artistic effects.

can shoot in a second – but just as importantly how many seconds you can shoot for before the camera's computer can't cope with any more data. Depending on your camera and your Image Quality settings and memory card used, a camera may only take four shots before it refuses to take any more pictures – taking a break until it has sufficiently caught up with recording the data stream. Switch from RAW to JPEG, however, and use the highest spec memory cards and, with some EOS models, you can keep your finger on the trigger and shoot continuously for literally thousands of shots.

Do it with style

Whether your choose to record in JPEG or RAW format also affects the way a picture is processed. The 'Picture Style' you use is a case in point. Changing the Picture Style is a bit like changing the type of film in the old days. Each Picture Style gives a different colour balance, saturation and contrast. The Faithful setting gives you a lower-contrast pastel-shade version compared to the Landscape option, which gives you the most saturated colours. Which you pick is ultimately down to personal choice – and with the most recent EOS models there is plenty of scope to customise the existing Picture Styles, or even create your own.

However, if you shoot in RAW, the Picture Style you choose does not actually affect the raw data – so can this choice can be completely ignored at the processing stage. For those using JPEG Quality settings (any of the L, M or S options that your camera offers) the choice of Picture Style is an important part of the creative process. But as you will find out in this lesson's homework assignment – even those shooting in RAW should take Picture Styles seriously. ■

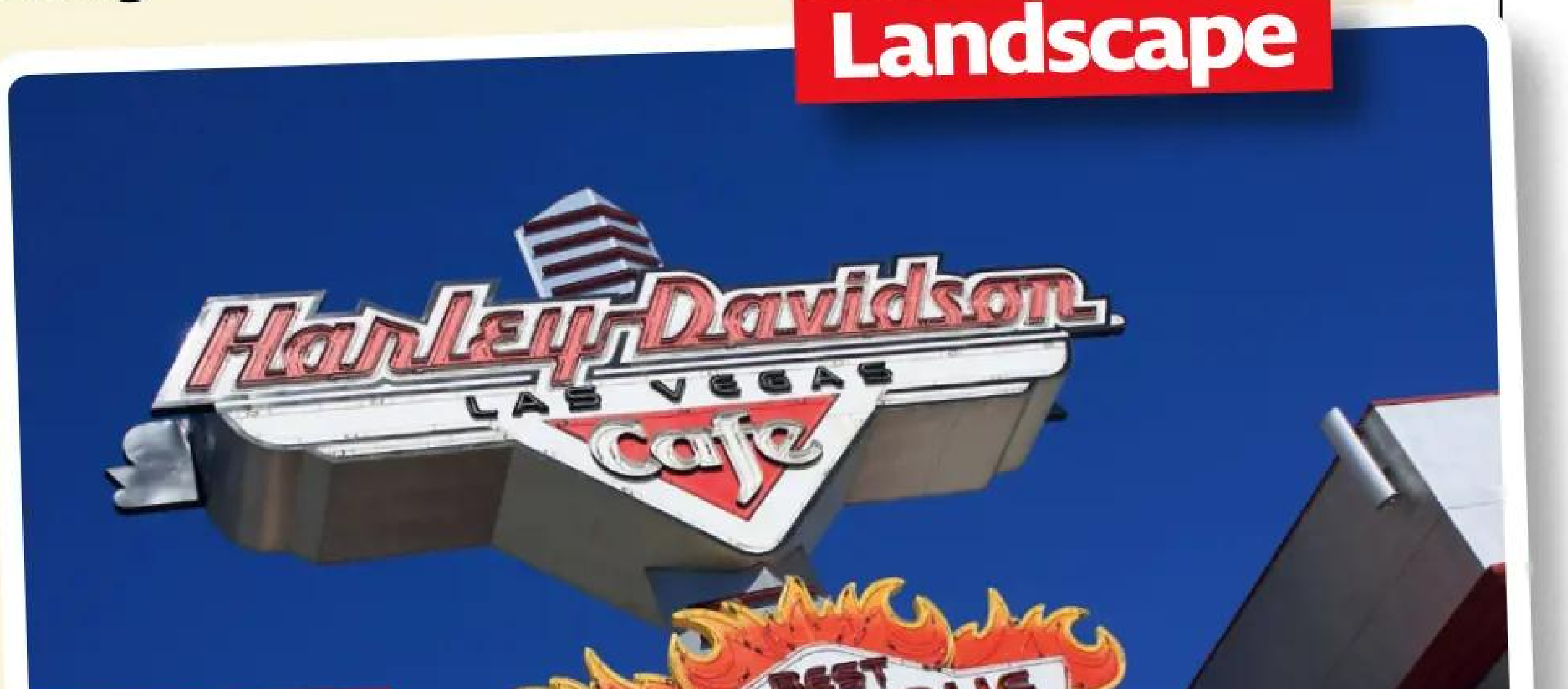
YOUR ASSIGNMENT! Pick your style

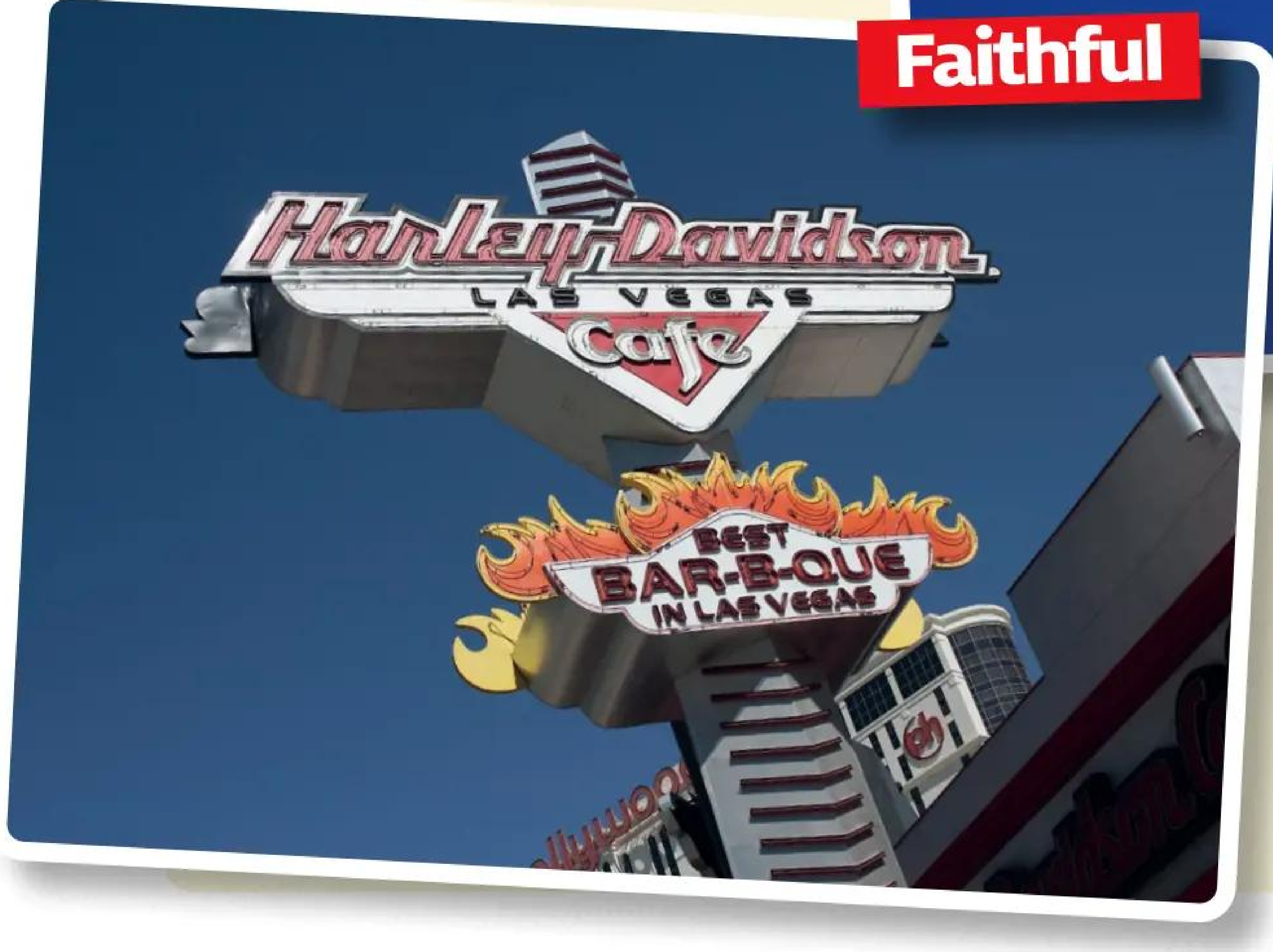
Picture Styles may seem like a gimmick – and particularly so if you shoot in RAW, where you can easily change all the relevant settings later as you process files on your computer. However, the Picture Style you use affects how the shot is displayed on the back of the camera's LCD; so setting the right Picture Style allows you to review your shots so they look as close to what they will be like when you have edited them. Using the right Picture Style becomes even more essential for when you choose to use one of the JPEG quality settings.

1 Take a series of identical shots using each of the six preset Picture Styles available on your camera. As different subjects and different lighting conditions may affect your Picture Style choice, use a test subject that is typical of the type of picture you usually shoot!

2 Look at the subtly different versions you have taken on the back of the camera. Which colour balance, saturation and contrast seems to suit the picture and your own taste best?

3 With recent EOS models, you can download additional Picture Styles for your camera. Check out the options available, and find out how to use them at: www.canon.co.jp/imaging/picturestyle/file/index.html.


Landscape


Faithful

LESSON 10

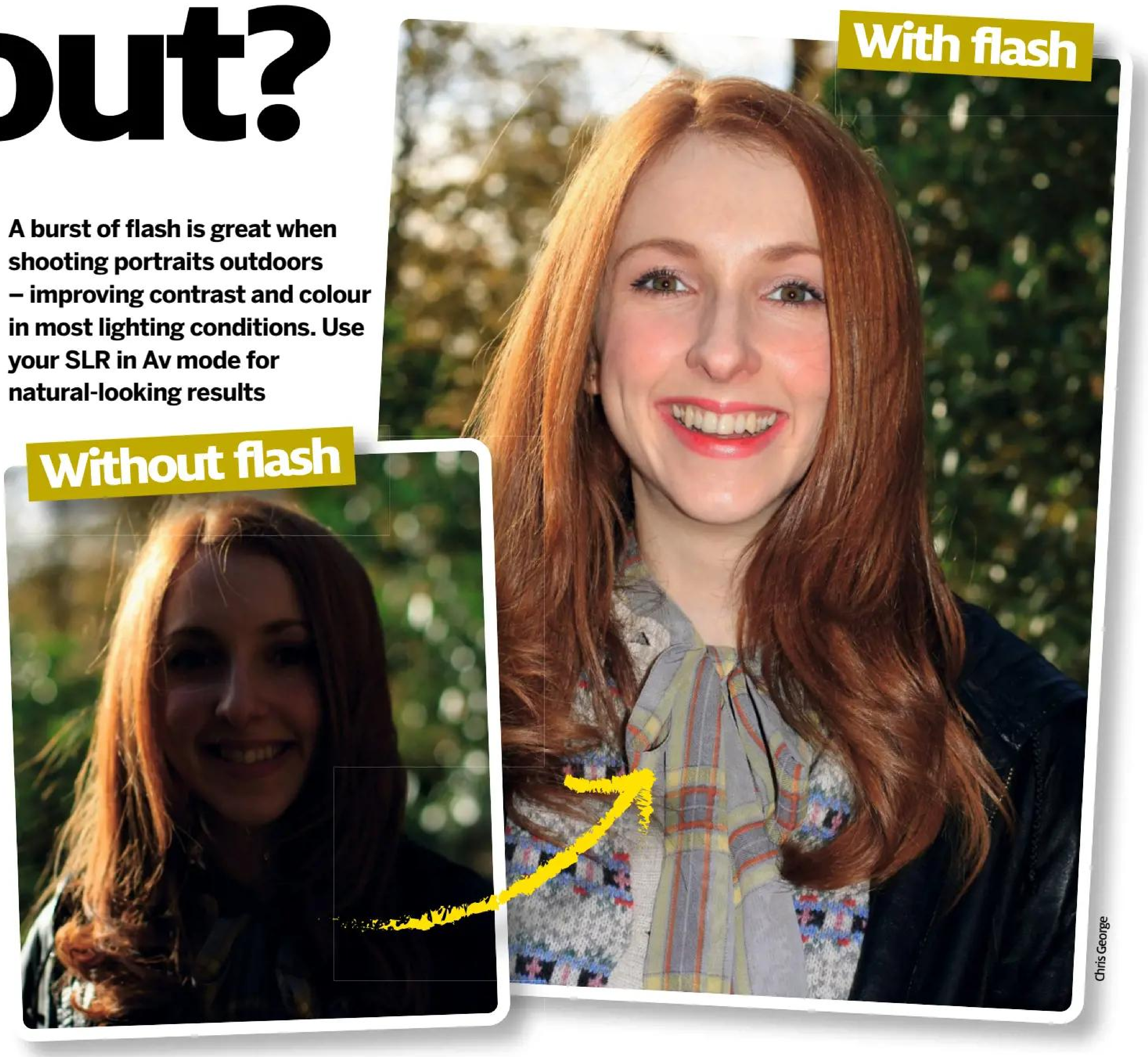
What is flash all about?

There is a time and a place for flash. It will often kill the atmosphere at a party, so is best avoided. But conversely can be the essential ingredient for a successful shot – in daylight or in the dark. The secret to success is to use the built-in flash on most EOS SLRs with caution. The key to getting good results is often a matter of exposure – ensuring you use settings that make the flash look as natural as possible.

Using flash adds an extra complication to the usual problems of exposure. You not only have to judiciously choose the shutter speed and the aperture and set the ISO to suit the occasion, the flash power must also be fed simultaneously into the exposure equation.

A flashgun provides a very brief burst of light – but the actual duration can be varied by the camera or photographer to alter how much flash 'power' is added to the scene. The amount of power needed to light a subject, of course, will depend on the aperture used (the wider the f-stop setting the less power required). The ISO setting is also an important factor – the higher the sensor sensitivity, the less flash power required.

A burst of flash is great when shooting portraits outdoors – improving contrast and colour in most lighting conditions. Use your SLR in Av mode for natural-looking results



Chris George

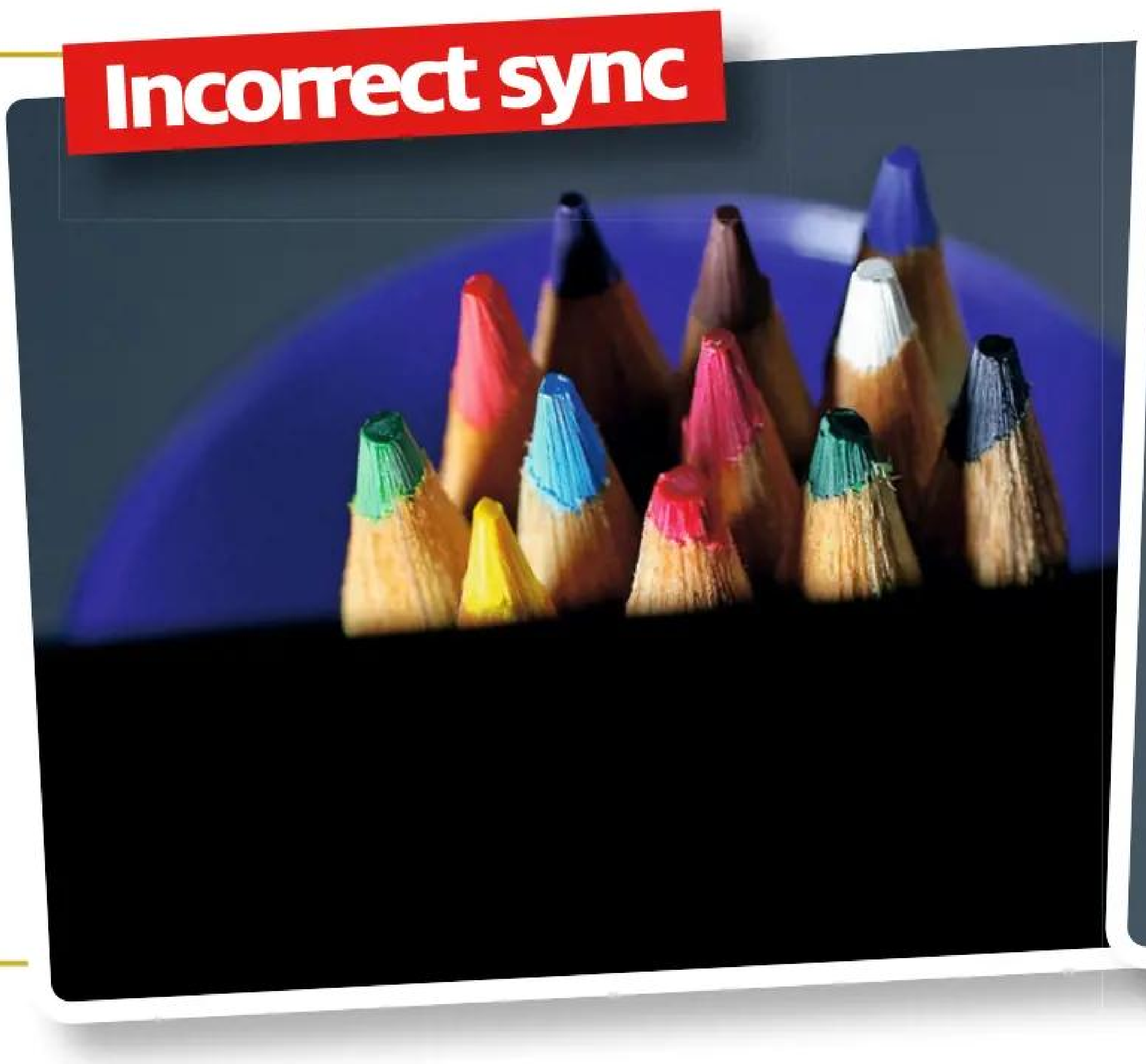
Sync speeds

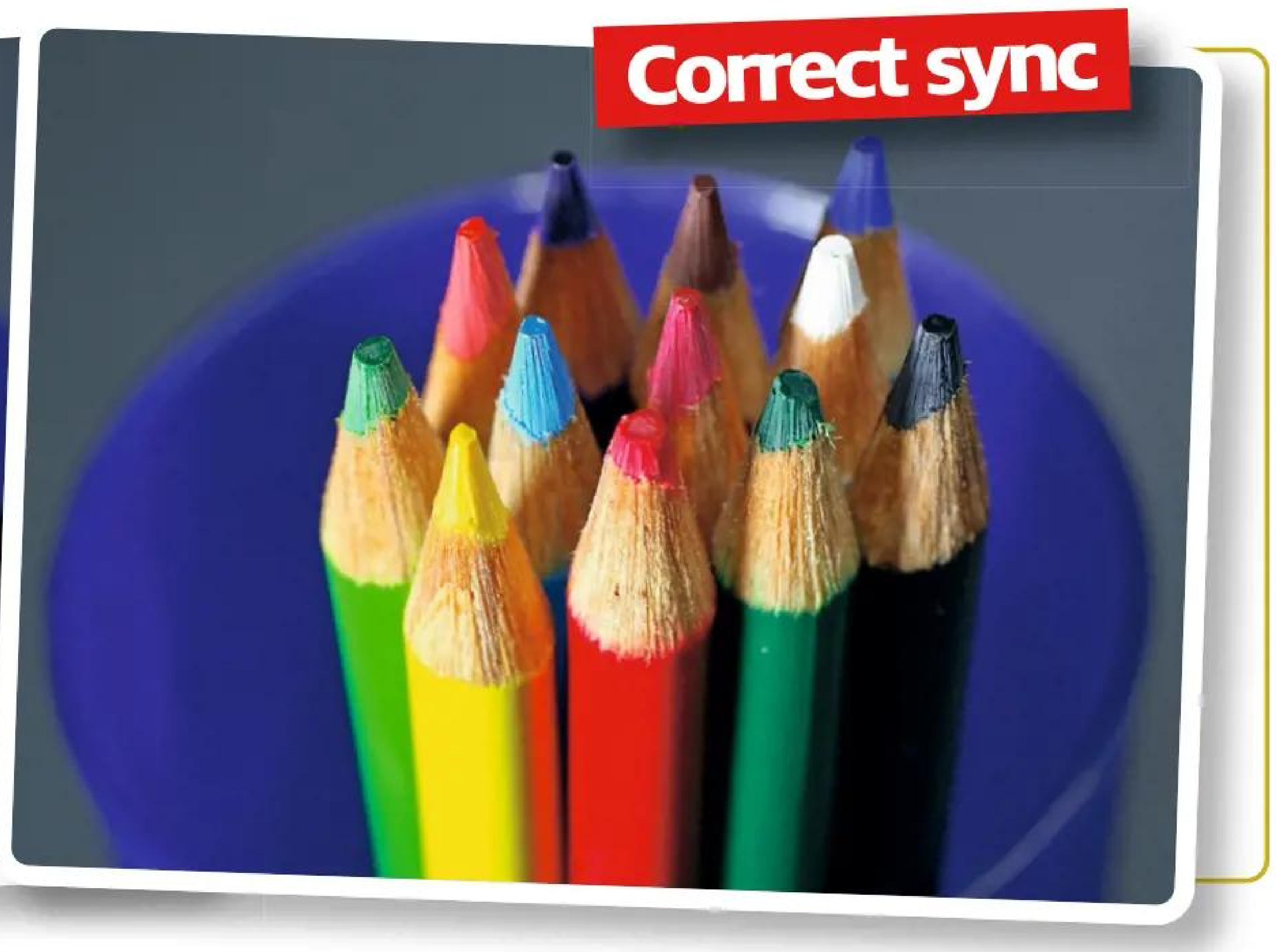
Interestingly, the shutter speed is often not a significant factor in the flash exposure calculation. The way that the 'focal plane' shutter of your EOS works means that you do not have the full range of your camera's shutter speeds on offer anyway. In normal flash modes, you need to ensure that the shutter speed is set at or below the 'sync speed' for your camera. EOS SLRs have sync speeds of either 1/200 sec or 1/250 sec, depending on the model; if faster shutter speeds are used then part of the image will be obscured by the falling shutter curtain.

Fortunately, most of the factors that need to be taken into consideration when calculating flash exposure are handled by the camera.

Sync speed

Unless you use HSS mode, you need to ensure you use a shutter speed of 1/200 sec or slower (1/250 sec or slower on some cameras) – if you shoot at a faster speed you will get a black horizontal band obscuring part of the picture.





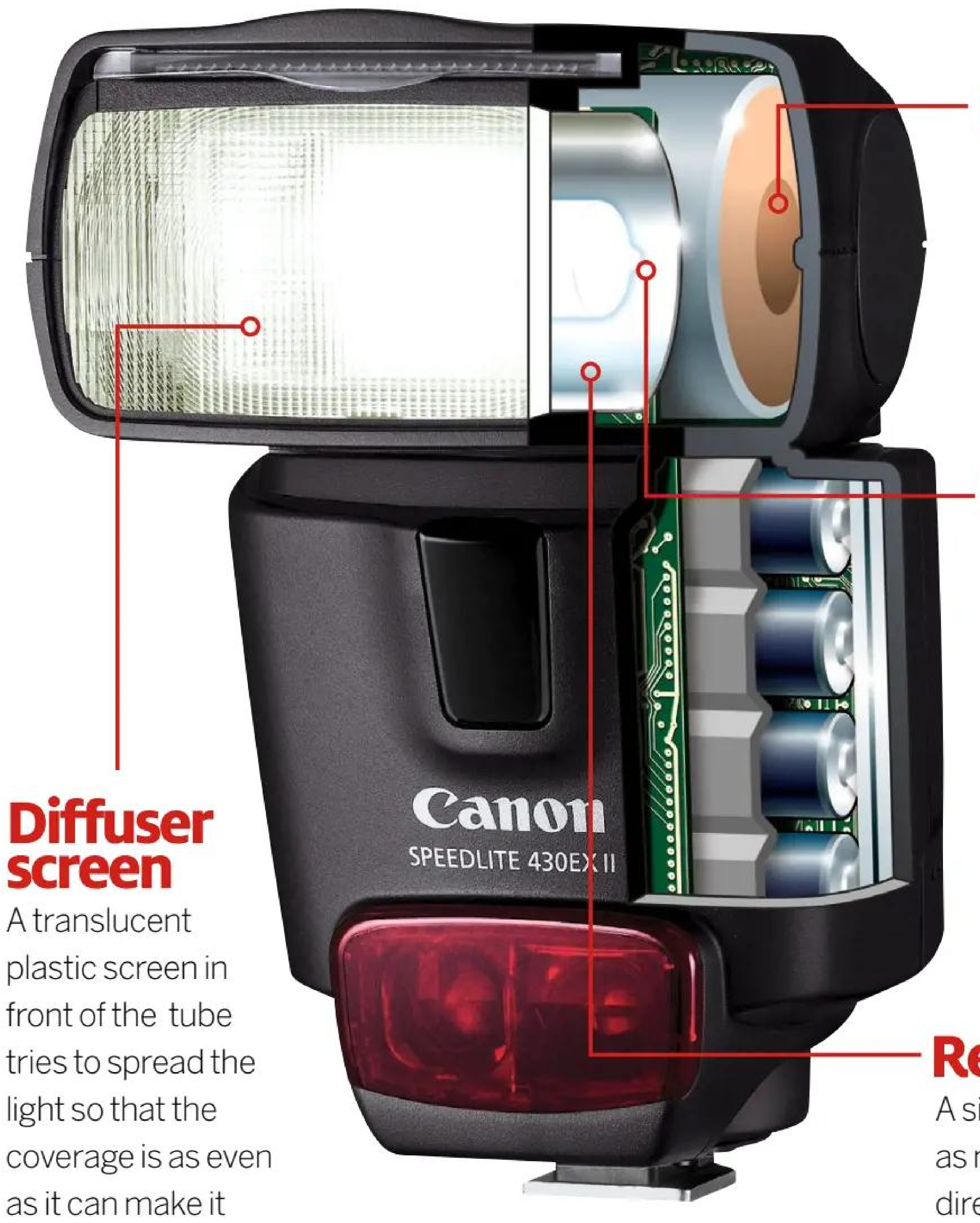
QUICK AS A FLASH

A built-in or hotshoe flashgun regulates the amount of illumination that it provides by varying the duration that the flash of light lasts This can be anything between 1/1000 sec and 1/50,000 sec. In low light, a brief duration of flash can freeze events invisible to the naked eye.

No tricks – card riffling caught using a regular flash exposure

Anatomy of a flashgun

What goes on under the shell of your strobe



Capacitor
A reservoir of electrical charge. A transformer ups the voltage from the batteries to the 300 volts needed for the flash tube

Flash tube
A glass tube filled with xenon gas, which the high voltage charge passes through to create the flash. An electrical coil around the tube excites the gas particles to give the arcing process a helping hand

Diffuser screen
A translucent plastic screen in front of the tube tries to spread the light so that the coverage is as even as it can make it

Reflector
A silvered surface ensures that as much light as possible is directed towards the subject

A suitable sync-friendly shutter speed is set for you, unless you use the camera's Manual (M) exposure mode – and as long as you are using the pop-up flash or a dedicated hotshoe flash.

An extra complication is that flash has a relatively limited range. The maximum power varies between the flash used – but once the subject is more than a few paces away, flash has little effect. This ensures that there are plenty of subjects where the use of flash is impractical.

E-TTL and E-TTL II

Exposure metering for flash is handled in a slightly different way than for non-flash 'ambient light' exposures. Your Canon digital SLR uses either E-TTL (Evaluative Through The Lens) metering, or the more recent E-TTL II metering.

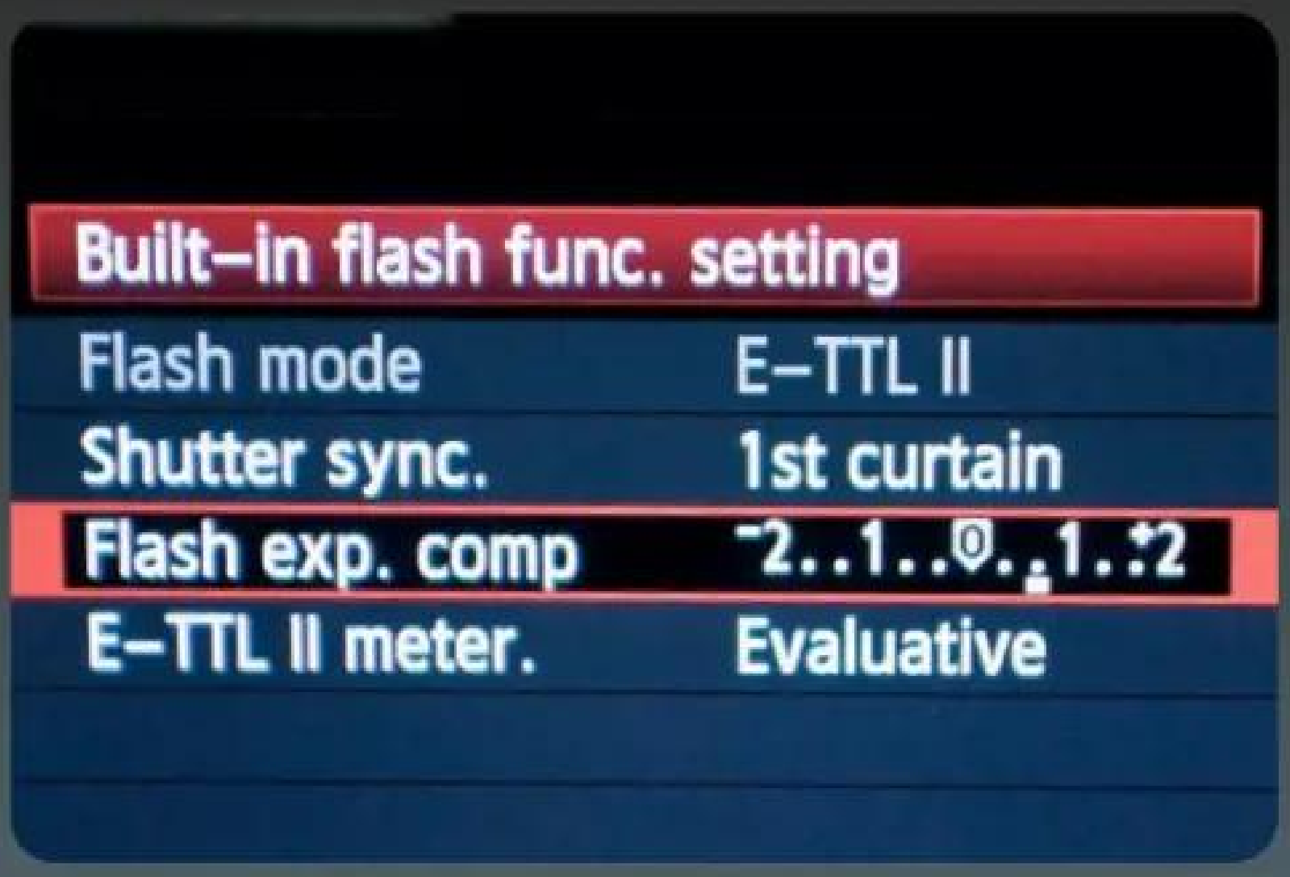
With both of these systems, flash power output is set by the flashgun firing briefly just before the shot is taken, and then measuring the light reflected back by the subject using the usual exposure metering sensor. This 'preflash' is all-but imperceptible to the human eye.

The E-TTL II system, found on all current Canon DSLR models, refines the original E-TTL measurement by also taking the subject distance into account – as measured by your lens's autofocus system. This helps ensure a more naturally balanced exposure – and minimises flash power errors caused by light-toned and dark-coloured subjects. ▶

STEP BY STEP How to take control of flash exposure

A-DEP
M
Av
Tv
P
CA

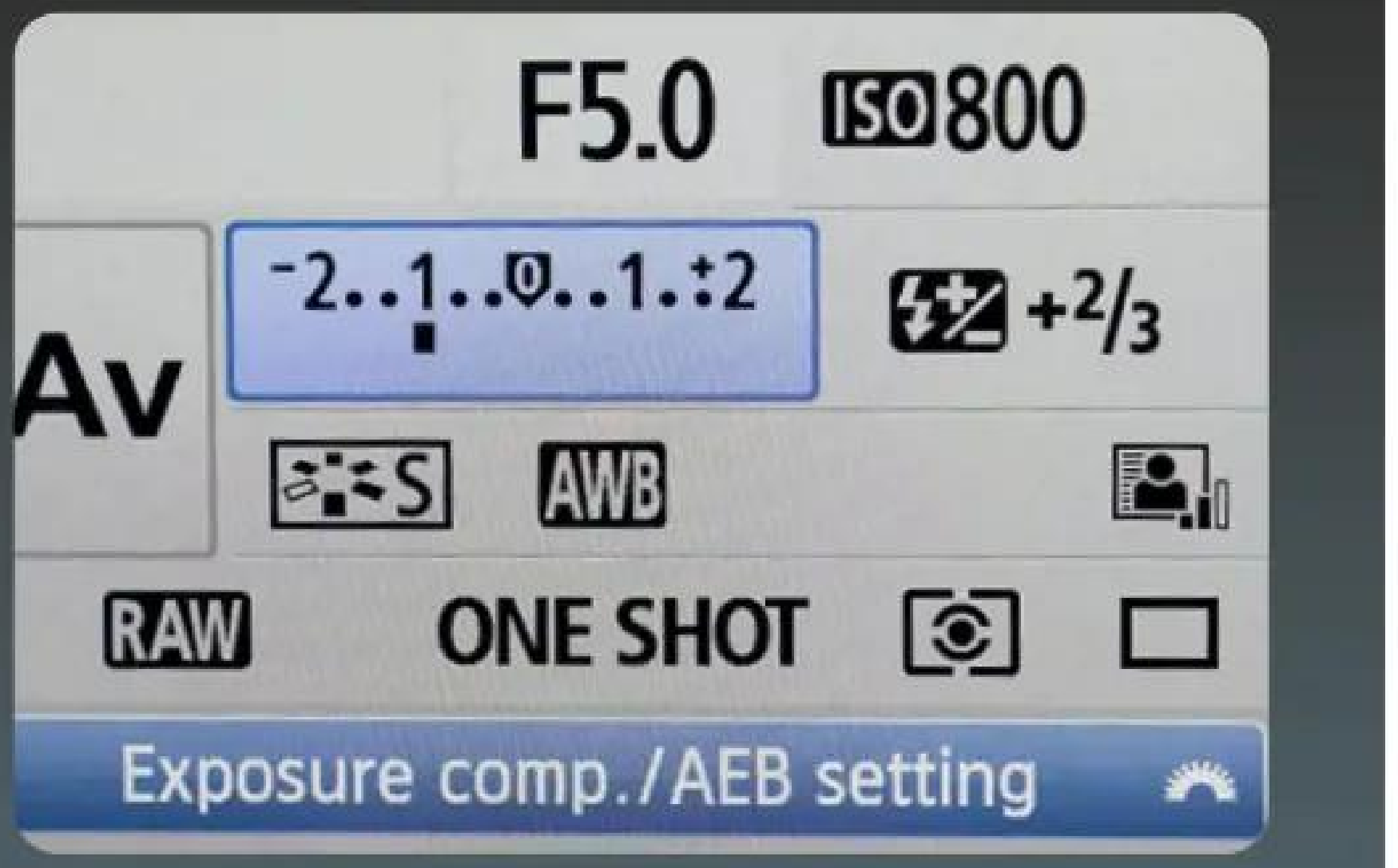
1 Switch to Av mode and set the aperture using the Main Dial on top of the camera. The shutter speed will be set for correct flash sync and so that the background is properly exposed.



Built-in flash func. setting
Flash mode E-TTL II
Shutter sync. 1st curtain
Flash exp. comp -2..1..0..1.:2
E-TTL II meter. Evaluative

2 Check the result, if the foreground (the area lit by the flash) is too dark or too light, use the flash exposure compensation facility to give more or less light and reshoot.

3 If the background (the area of the image not reached by the flash) is too dark or too light, use the normal exposure compensation facility to alter the shutter speed.



F5.0 ISO800
Av -2..1..0..1.:2 +2/3
AWB
RAW ONE SHOT
Exposure comp./AEB setting

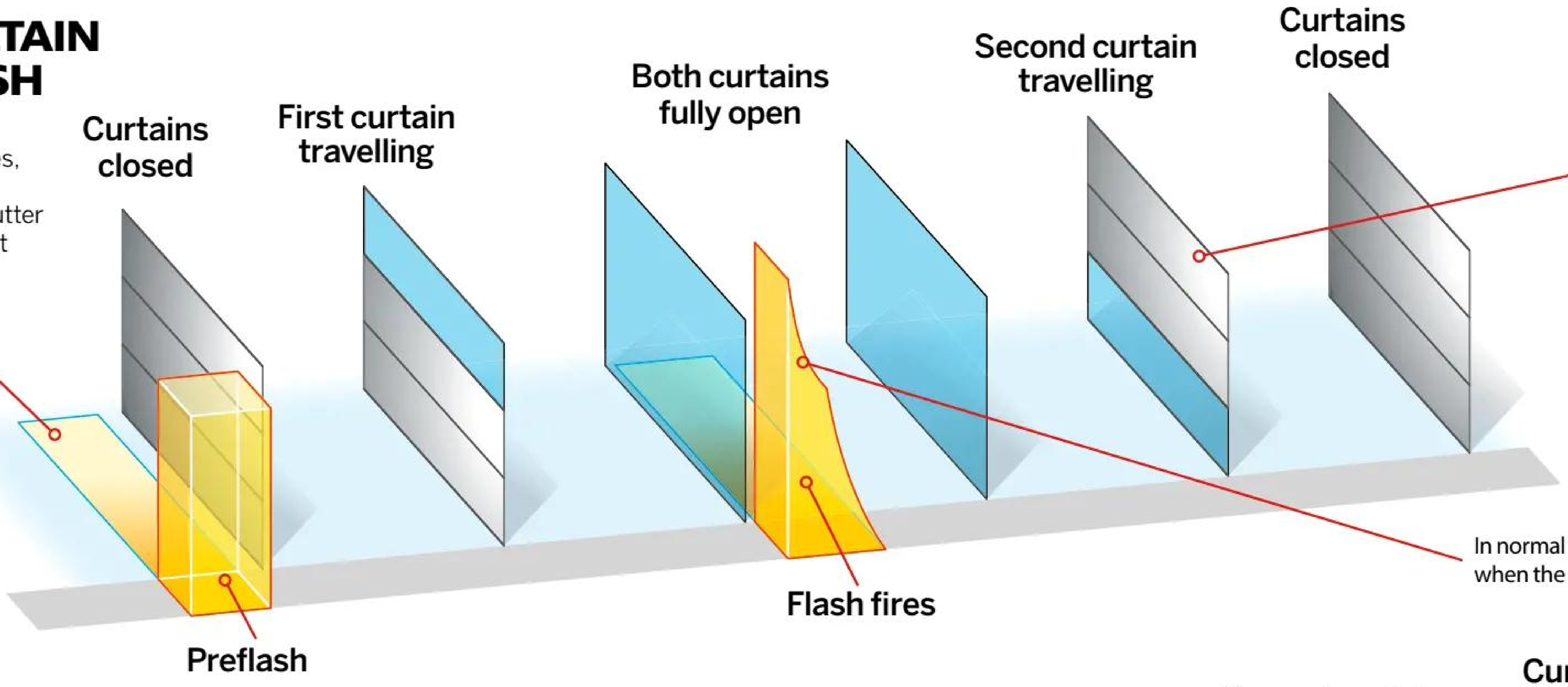
4 Dial in a negative amount of exposure compensation if the background is too bright. If it looks too dark, use a positive amount of compensation (say, +1). Then reshoot the scene.

A question of split-second timing

When the flash fires depends on the shutter speed, and on the flash mode used

FIRST-CURTAIN SYNC FLASH

In all auto flash modes, the flashgun briefly pulses before the shutter fires, so that it can set the flash duration to suit the subject

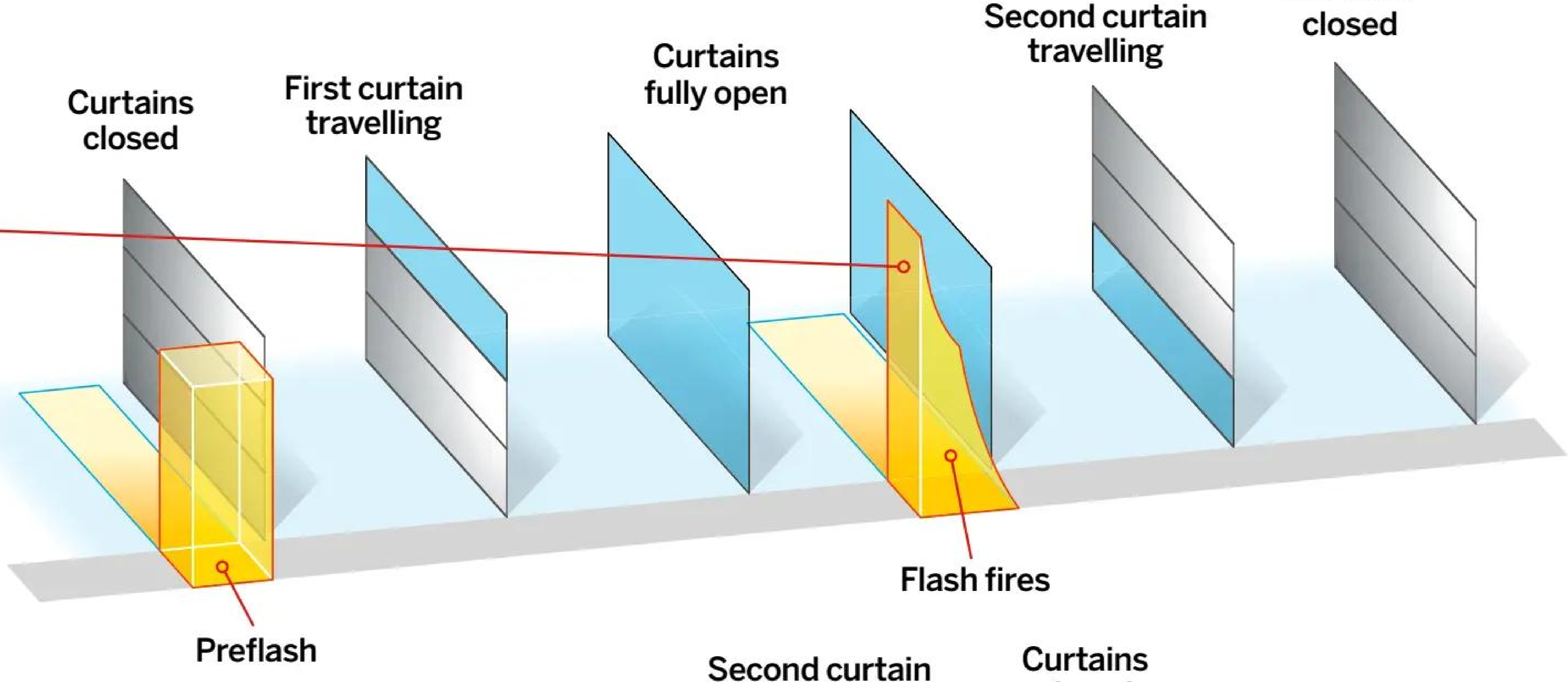

Curtains closed
First curtain travelling
Both curtains fully open
Second curtain travelling
Curtains closed
Preflash
Flash fires

The shutter is made up of two metallic blinds, or curtains. The first opens to start the exposure, the second closes to finish the exposure. The flash needs to fire when the shutter is fully open

In normal flash mode, the flash fires when the first curtain is fully open

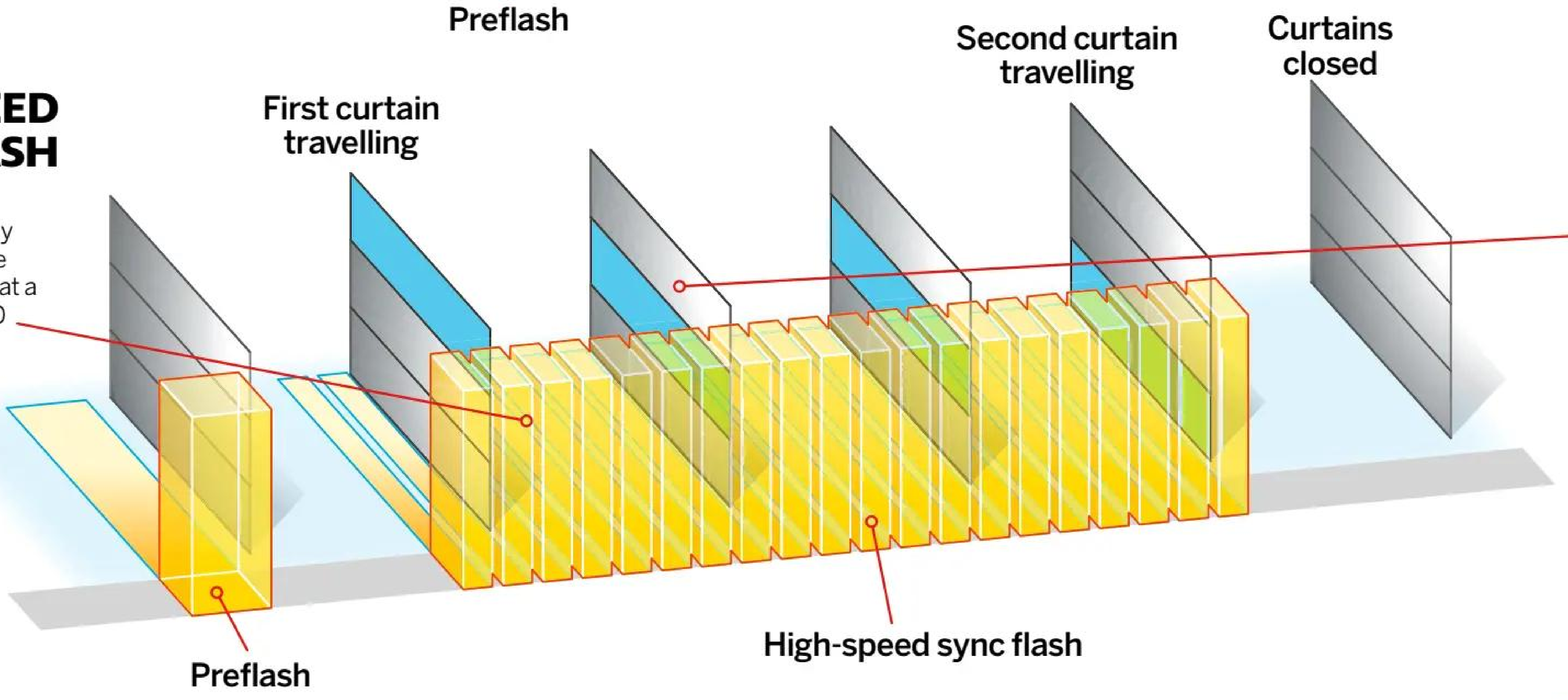
SECOND-CURTAIN SYNC FLASH

If the camera or flash is set to second-curtain sync, the flash will fire at the end of the period where the shutter blinds are fully open – rather than at the beginning of this period. This is useful with moving subjects, and with slower-than-usual shutter speeds


Curtains closed
First curtain travelling
Curtains fully open
Second curtain travelling
Curtains closed
Flash fires
Preflash

HIGH-SPEED SYNC FLASH

The flash continually fires throughout the exposure – pulsing at a rate of up to 50,000 times a second (see below)


First curtain travelling
Second curtain travelling
Curtains closed
Preflash
High-speed sync flash

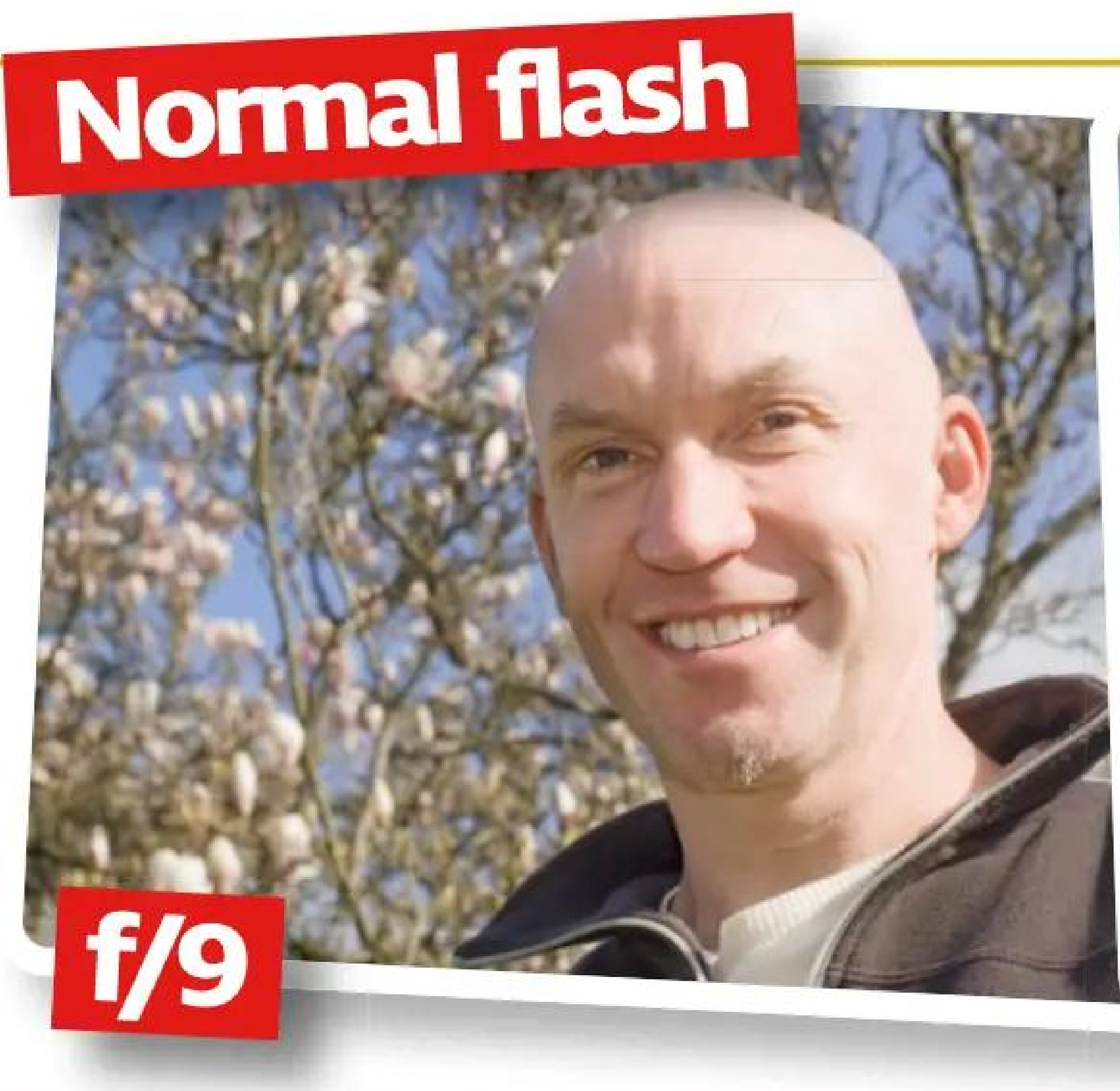
At shutter speeds above the SLR's normal 'sync speed', the shutter is never fully open. At shutter speeds above approximately 1/200 sec, the exposure is therefore made by a moving slit, created by the two shutter curtains

Illustration: Andy McLaughlin

High-Speed Sync

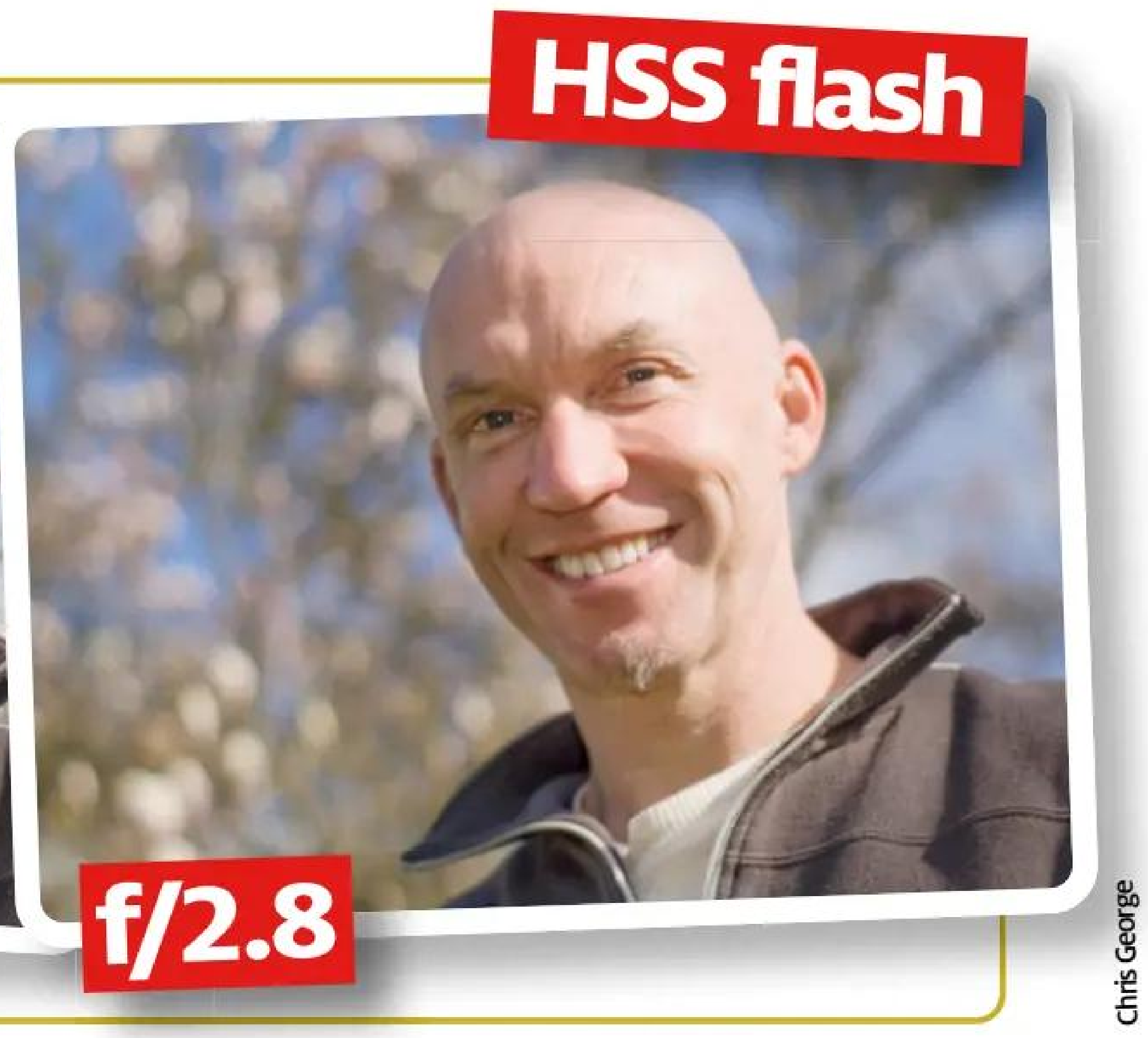
The HSS facility found on some flashguns allows you to use shutter speeds faster than the usual sync speed. This feature allows you to use apertures that are wider than those usually available with flash, and still get the background properly exposed. This is particularly useful for outdoor portraits, as you can use fast lenses wide open to completely blur the background. Be warned that the faster the shutter speed you use, the lower the effective power of the flash becomes.

Normal flash



f/9

HSS flash

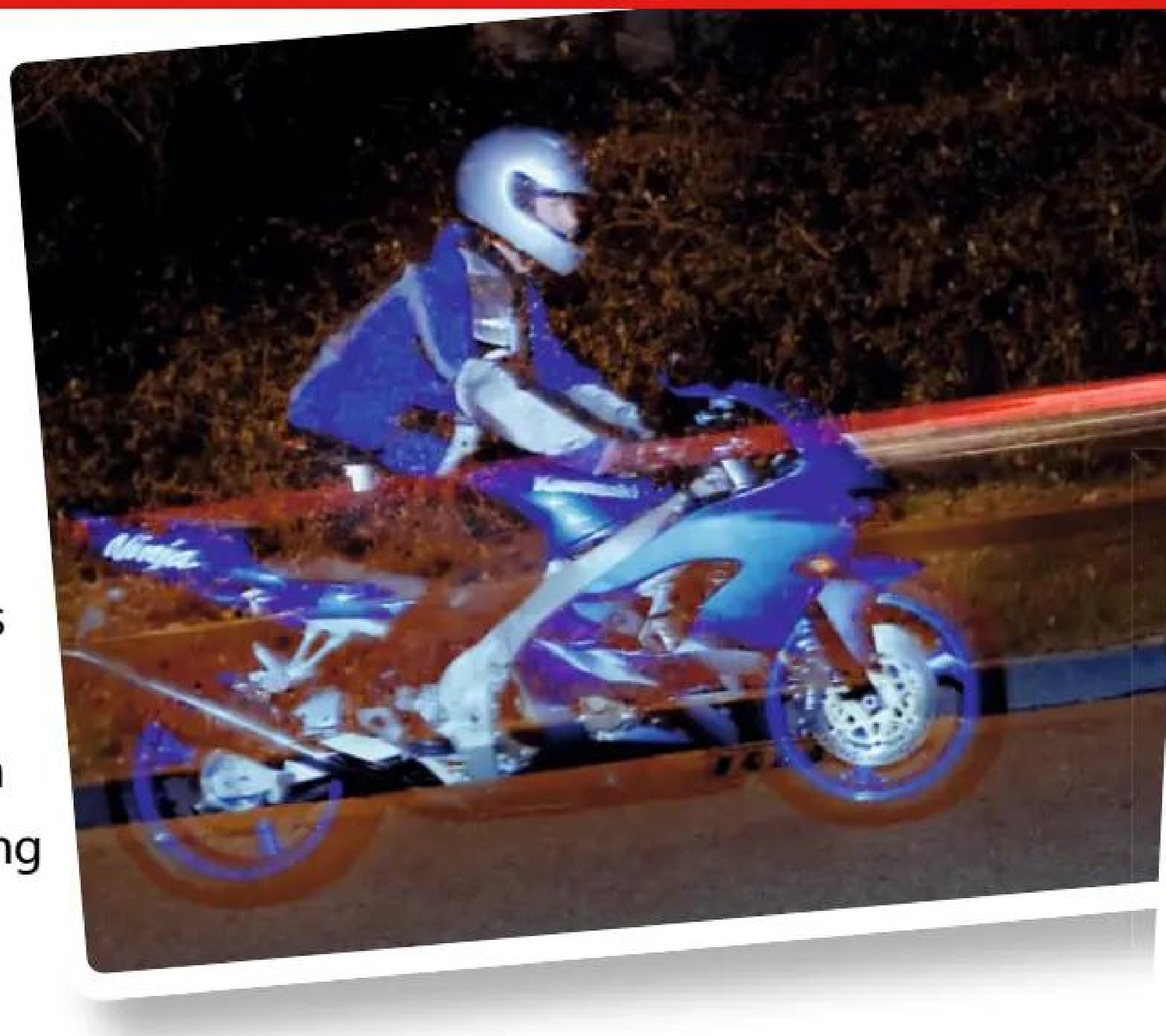


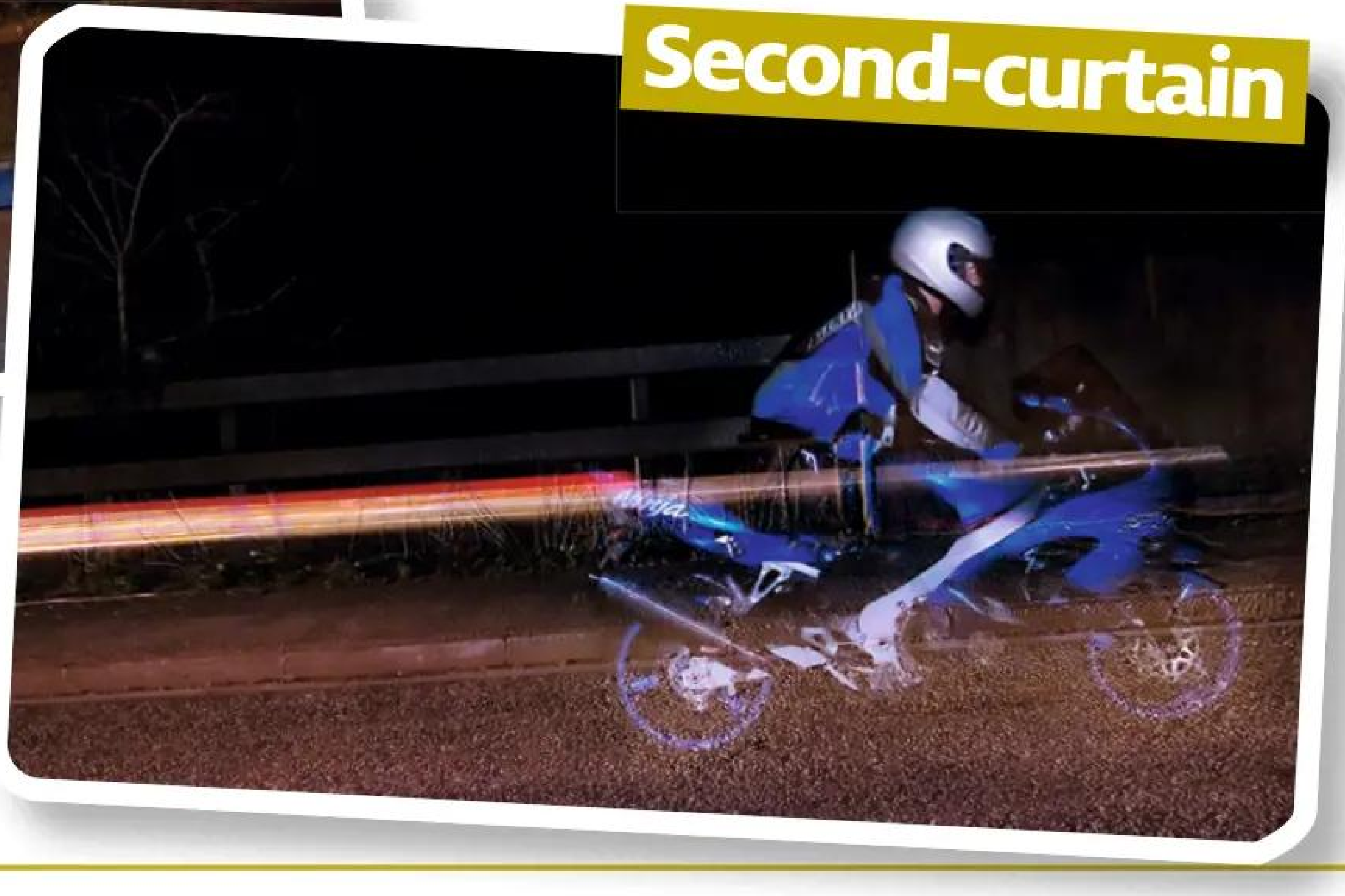
f/2.8

Chris George

Second-curtain flash

With normal flash, the flash fires as soon as the shutter is fully open. But when the shutter speed is slower than usual, this can lead to some peculiar results when shooting moving subjects. Blurred lines created by the ambient light appear in front of the subject, which look particularly out of place if the subject is moving in a straight line. A more natural effect, with the blurred ghost image appearing behind the subject, is achieved if the built-in or hotshoe flash is set to second-curtain sync. In this mode, the flash fires just before the shutter begins to close (see diagram, opposite).


Chris George



Second-curtain sync is useful when shooting slow-shutter speed shots of subjects moving in a straight line

Inevitably, despite the sophisticated metering, automatic flash will not always give the results that you want. For complex flash setups, such in a studio, it is often best to switch to Manual mode, set the shutter speed to a suitable sync speed, adjust aperture to give the depth of field you need, and then simply manually adjust the flash power to give the lighting level that you want.

With built-in and hotshoe flash, however, your Canon camera provides two simple ways in which to get your exposure spot-on, even when using auto settings. For most flash pictures, you are best off using the Av (aperture priority) exposure mode from the camera's Main Dial. As long as the Custom Functions have not been set to do otherwise, in this mode the camera tries to ensure that the background and foreground are both exposed perfectly. Essentially, the camera uses the flash power setting and the aperture to control the exposure of the flash-lit foreground, then adjusts the shutter speed to make sure the background is neither too light or too dark.

Flash exposure compensation

On the other hand, if you find that the flash power is too strong or too weak, you can adjust this using your camera's Flash exposure compensation facility. On high-end cameras, a top-plate button gives you fast access to this override; on other models you will have to delve in the EOS's menu options in order to reduce or increase the flash output.

In order to adjust the brightness of the background in the image (the area of the image that is not lit by the flash) you use the main exposure compensation facility. With cameras like the 700D, this means pressing the +/- key whilst turning the Main Dial. With cameras like the 7D Mk II or 5D Mk IV, you use the thumbwheel on the back of the camera to make the adjustment. ■

YOUR ASSIGNMENT!

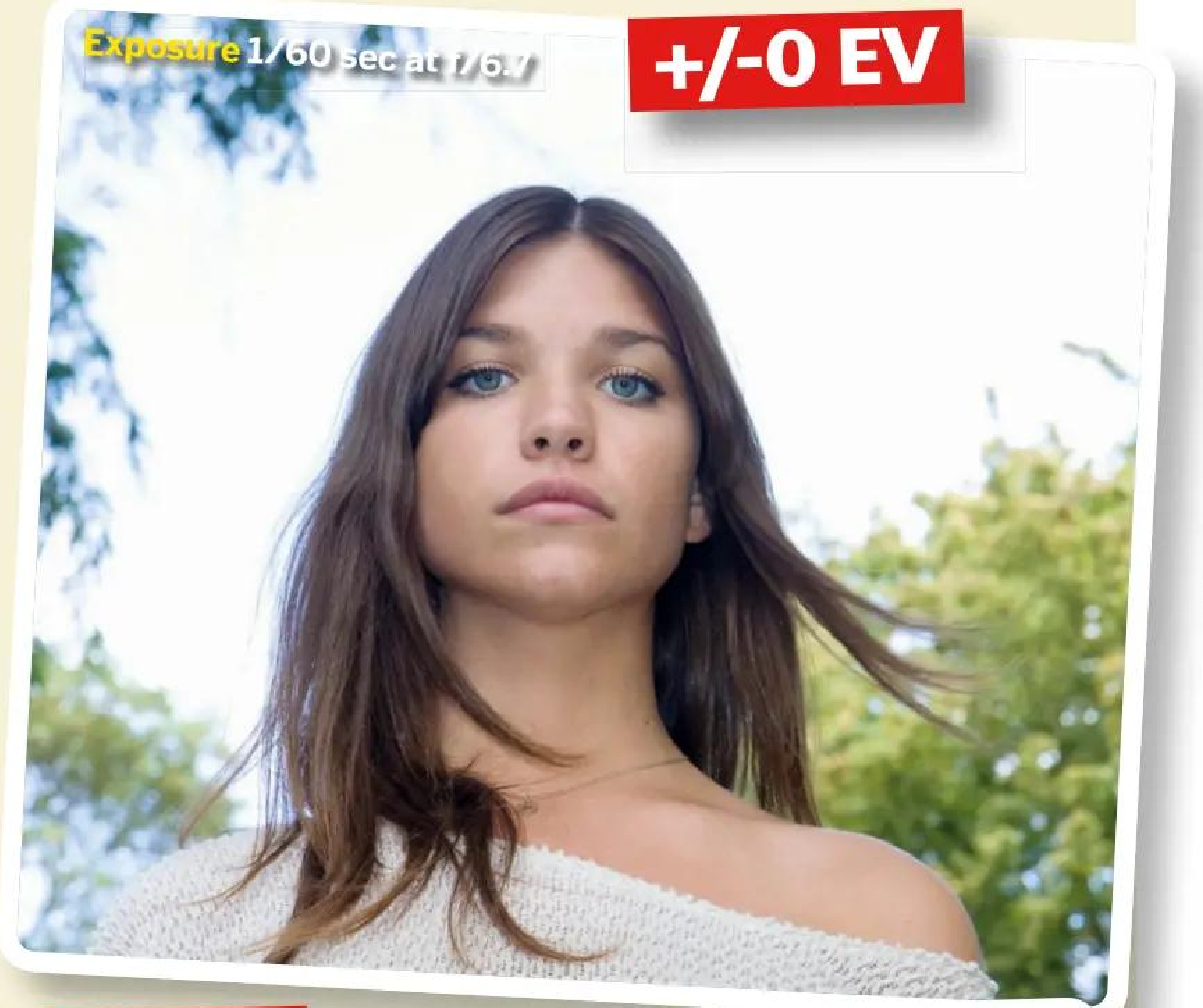
Altering background brightness

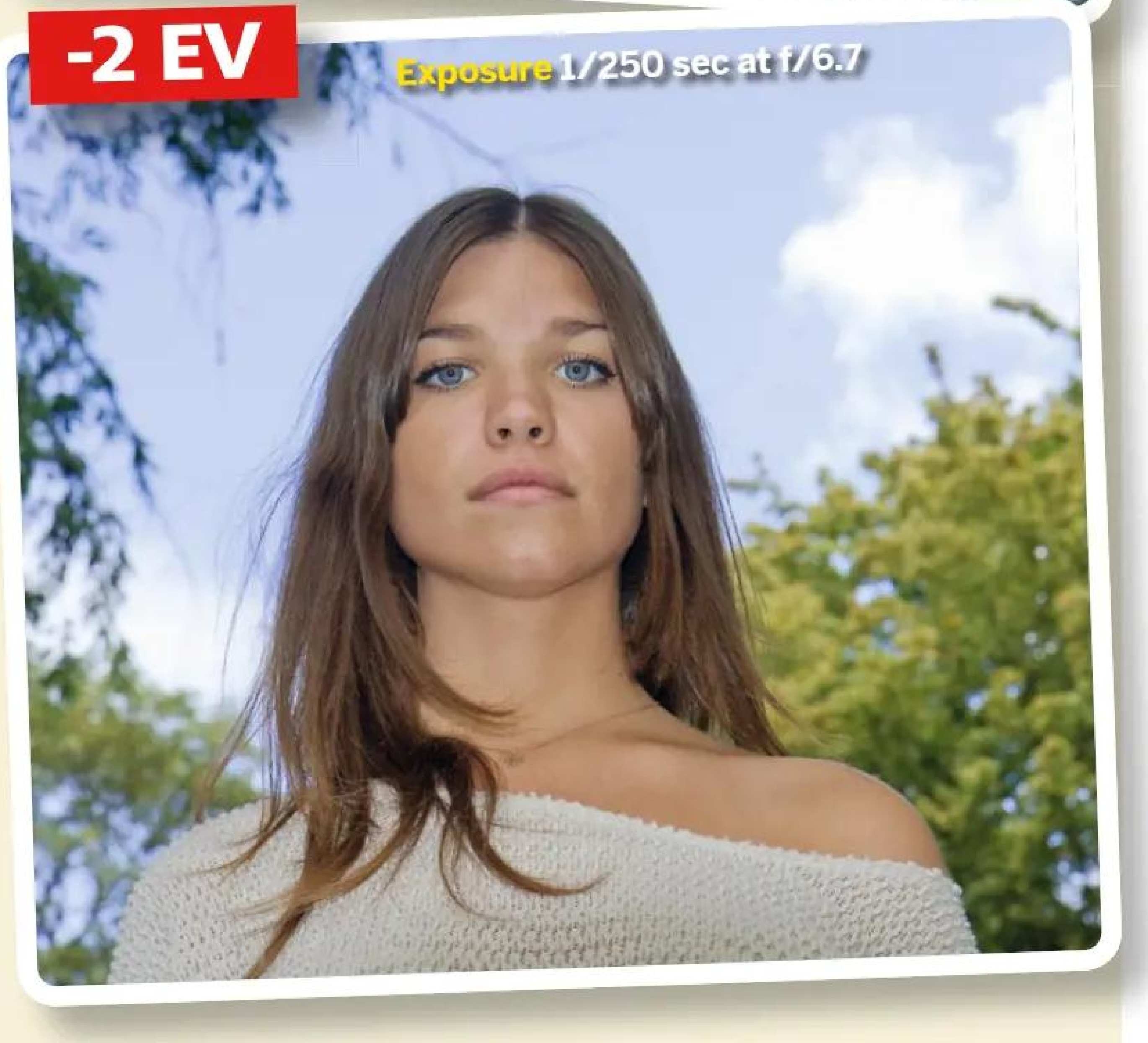
Using flash usually gives you nicely exposed foregrounds, but the backgrounds can often appear to dark or too dark. Shoot at night, and a cityscape or a living room can look too dark – lacking the details you can see with your naked eye. Outdoors during the day, blue skies can end up looking bleached white in your fill-flash shots. The answer to both problems is to use exposure compensation…

1 **Try shooting a portrait indoors after dark (or on a lit street outdoors). Shoot with your built-in flash (or hotshoe flash if you have one) with the Exposure Mode set to Av. Shutter speeds may be slow – if so use a tripod, if possible, or increase the ISO to around 800, to avoid the background looking blurred.**

2 **The background in your after-dark image will typically look too dark. Set exposure compensation to +1 (or possibly +2) and then reshoot.**

3 **Shoot a flash picture outdoors on a bright day. The background in your shots will often look too bright – particularly if they include a large area of sky. Set exposure compensation to -1 (or possibly -2) and reshoot.**


Exposure 1/60 sec at f/6.7
+/-0 EV


-2 EV
Exposure 1/250 sec at f/6.7

LESSON 11

What is ISO all about?

ISO1000

Exposure 1/15 sec at f/5.6

Chris George

ISO100

Exposure 20 secs at f/9

Chris George

You only need to use a high ISO in low light if the camera is handheld, or the subject is moving. With static subjects, and a tripod, you can use the slowest setting (ISO100)

Back in the days before digital, film came in a variety of different speeds. The 'faster' the film, the more sensitive it was to light – allowing you to use faster shutter speeds than with 'slower' film. Using these higher-sensitivity film emulsions was useful for moving subjects – and particularly so in low light. This film speed was measured using a number of different scales – with two of the best known, the American ASA and German DIN scales, eventually being brought together to give us the standardised ISO system.

Digital cameras, of course, do not use film – but the same ISO scale is now used to measure the camera's sensitivity to light. Although the camera's imaging chip cannot be changed to suit the subject (unlike film), its sensitivity can effectively be boosted by the camera's circuitry. This is done with the ISO control. Think of ISO as being like the volume control on your radio. If the signal is weak, you crank it up to compensate. The signal from the sensor is simply amplified – and this helps you get the fast enough shutter speed you want in low light.

Digital advantage

The advantage of digital over film is that the ISO can be altered for each individual shot. This makes ISO a powerful tool for the photographer, helping you to get sharp shots in a variety of lighting conditions.

ISO is the name of the International Organization of Standardization: a body that creates thousands of agreed standards for a huge range of products, procedures and practices. For the photographer, ISO is simply a set of numbers. The base sensitivity of all current Canon EOS SLRs is ISO100. But this can be increased by pressing the appropriate button, then rotating the main dial (on some older cameras ISO is changed through the Menu button). The scale is such that doubling the ISO number doubles the sensitivity of the sensor. So increasing the ISO setting from 100 to 200 means that, to get the same overall exposure, you can use a shutter speed that is half as long (or twice as fast).

Each doubling of the ISO also increases the sensitivity by a full exposure 'stop' – with the typical full-stop ISO scale progressing 100, 200, 400, 800, 1600, and so on. The top ISO setting varies depending on the age and cost of your Canon DSLR – from ISO3200 to ISO204,800 on current models.

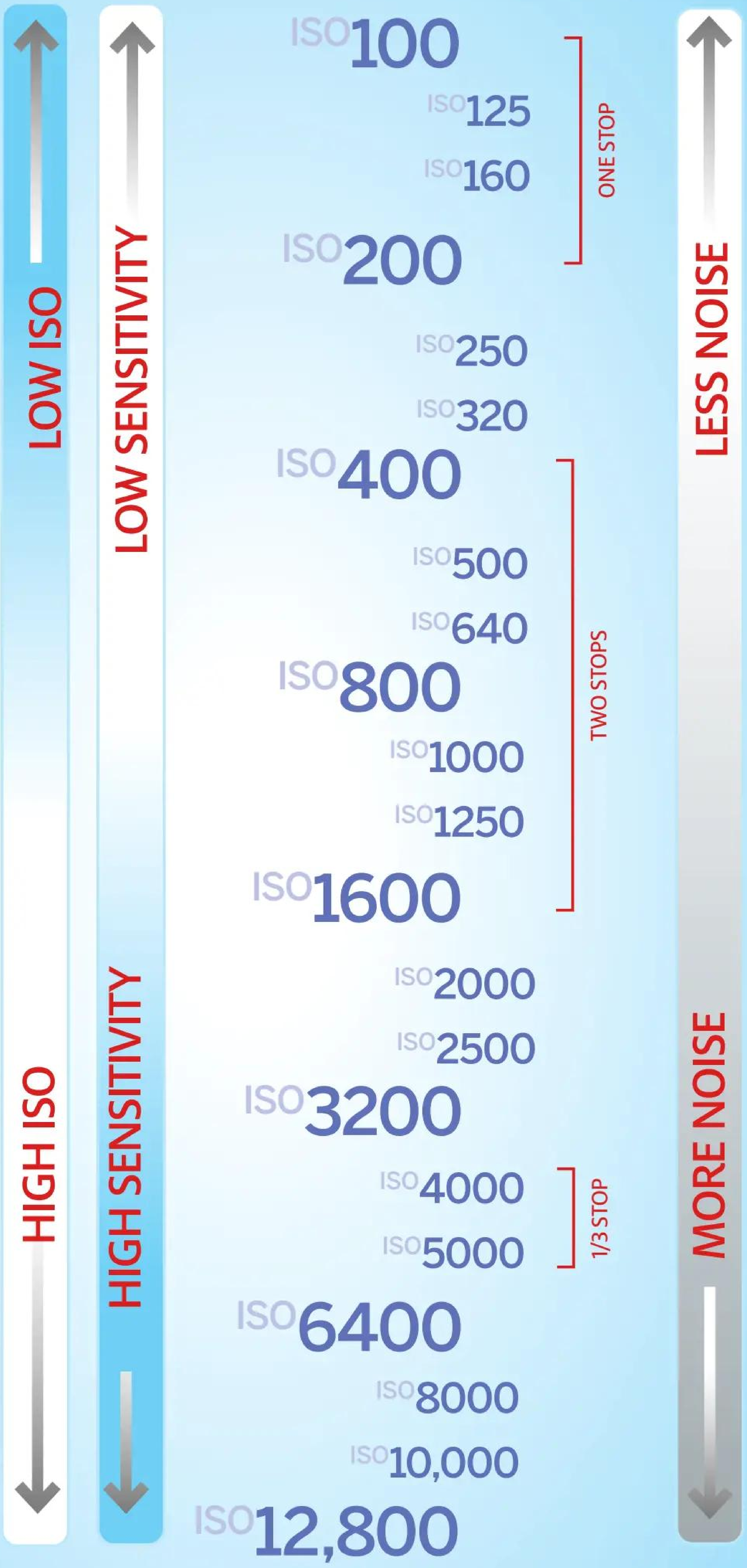
Bizarrely, the top ISO settings on many models are 'hidden', and must be enabled using a ▶

Making sense of the ISO scale

As ISO doubles, the camera becomes twice as sensitive to light

What the L is this?

Some top EOS SLRs, such as the EOS 5D Mk II (above), have an 'L' or Low ISO setting, which is equivalent to ISO50 – and is half as sensitive to light to the lowest ISO100 setting found on most cameras. This option is loved by landscape photographers, as the lower sensitivity makes it easier to capture blur in moving water.

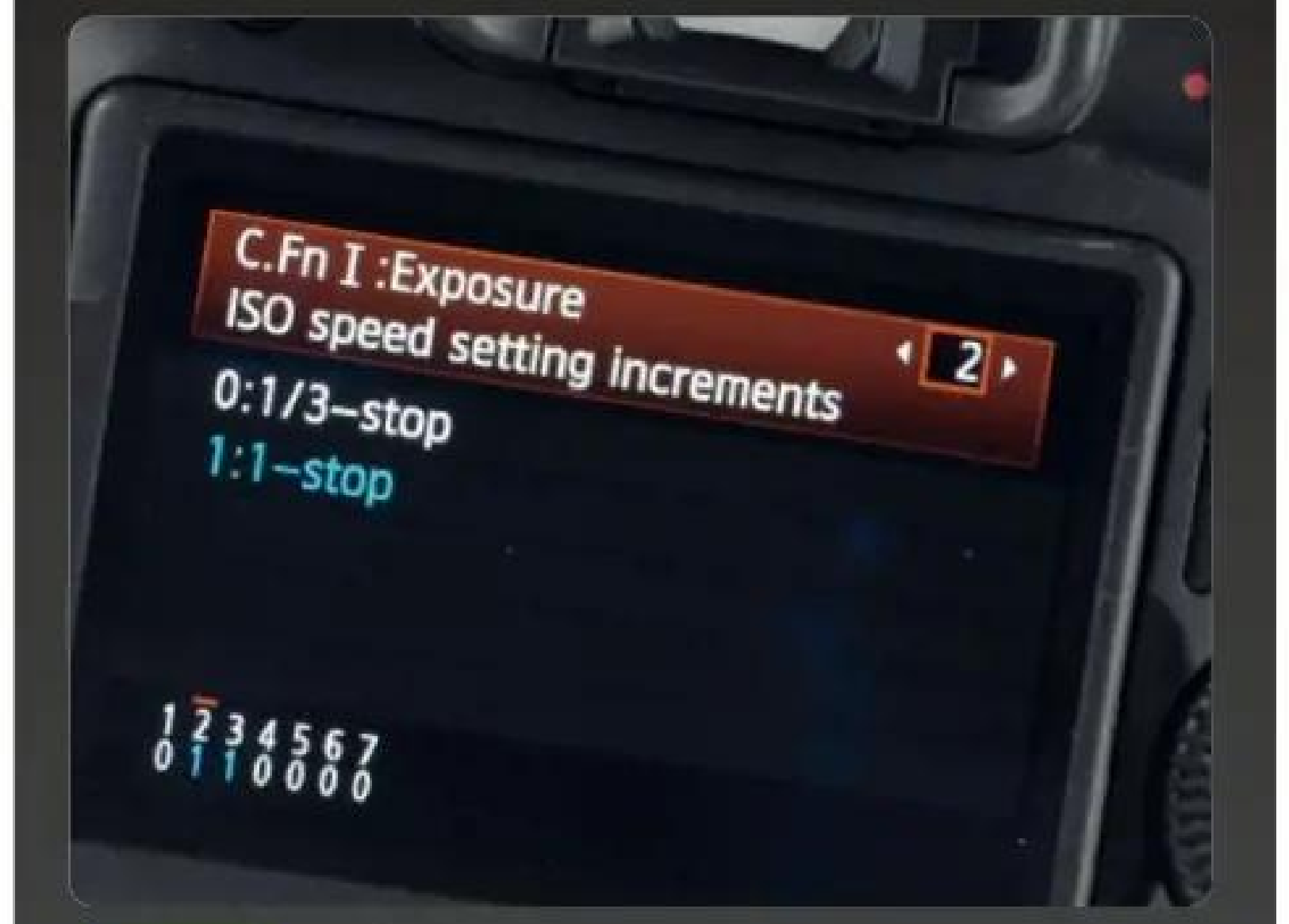

LOW ISO
HIGH ISO
LOW SENSITIVITY
HIGH SENSITIVITY
ISO100
ISO125
ISO160
ISO200
ONE STOP
ISO250
ISO320
ISO400
ISO500
ISO640
ISO800
ISO1000
ISO1250
ISO1600
TWO STOPS
ISO2000
ISO2500
ISO3200
ISO4000
ISO5000
1/3 STOP
ISO6400
ISO8000
ISO10,000
ISO12,800
LESS NOISE
MORE NOISE

ISO204,800 record breaker!

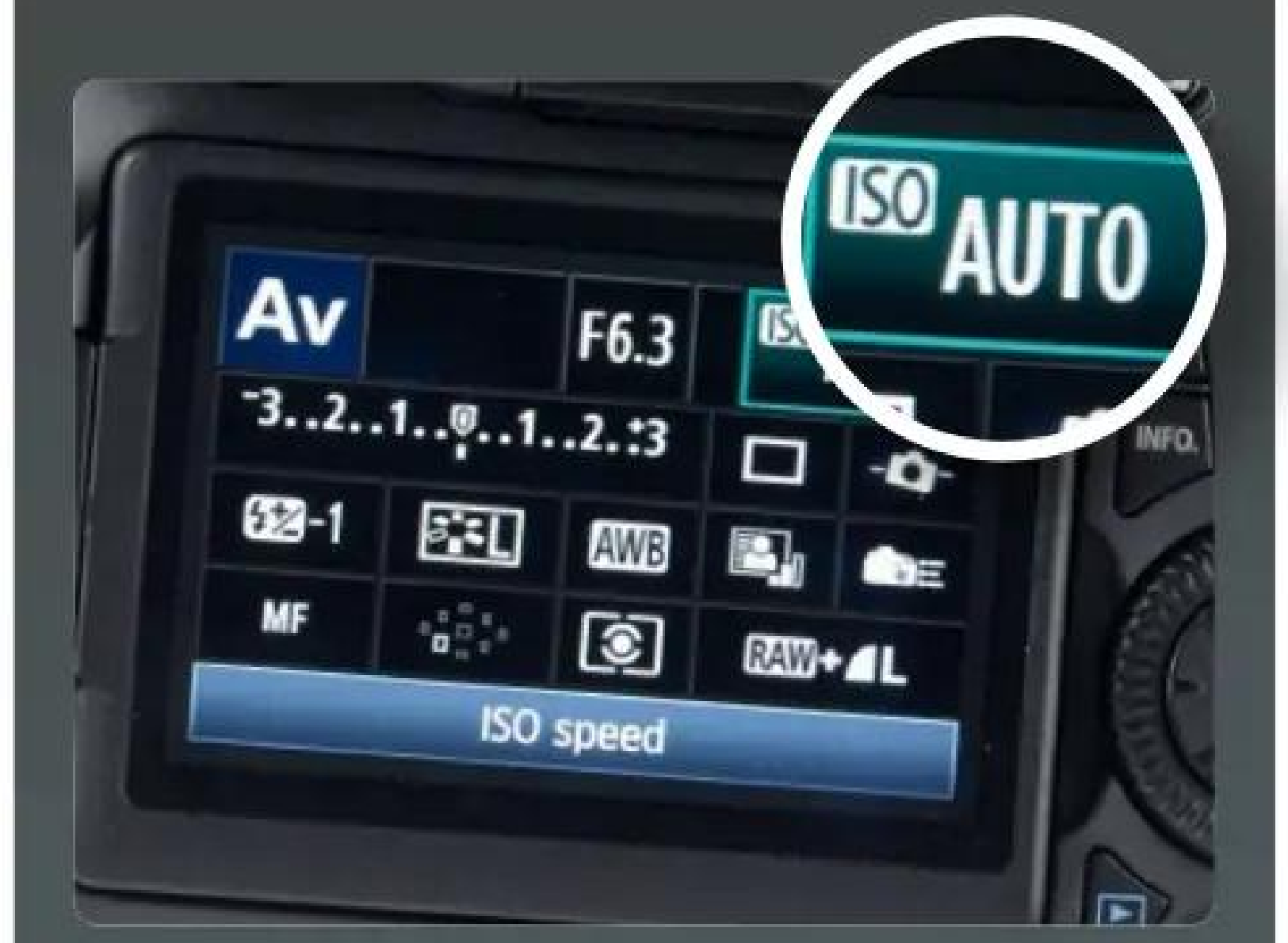
The maximum ISO setting varies from model to model. Some recent DSLRs have an even higher maximum than ISO12,800. Canon's high-octane EOS-1D X (left) can shoot at a staggering ISO204,800. Top ISO speeds have gradually increased over the years. Back in 1995, Canon's EOS DCS 1 had a top sensitivity setting of just ISO100!

STEP BY STEP

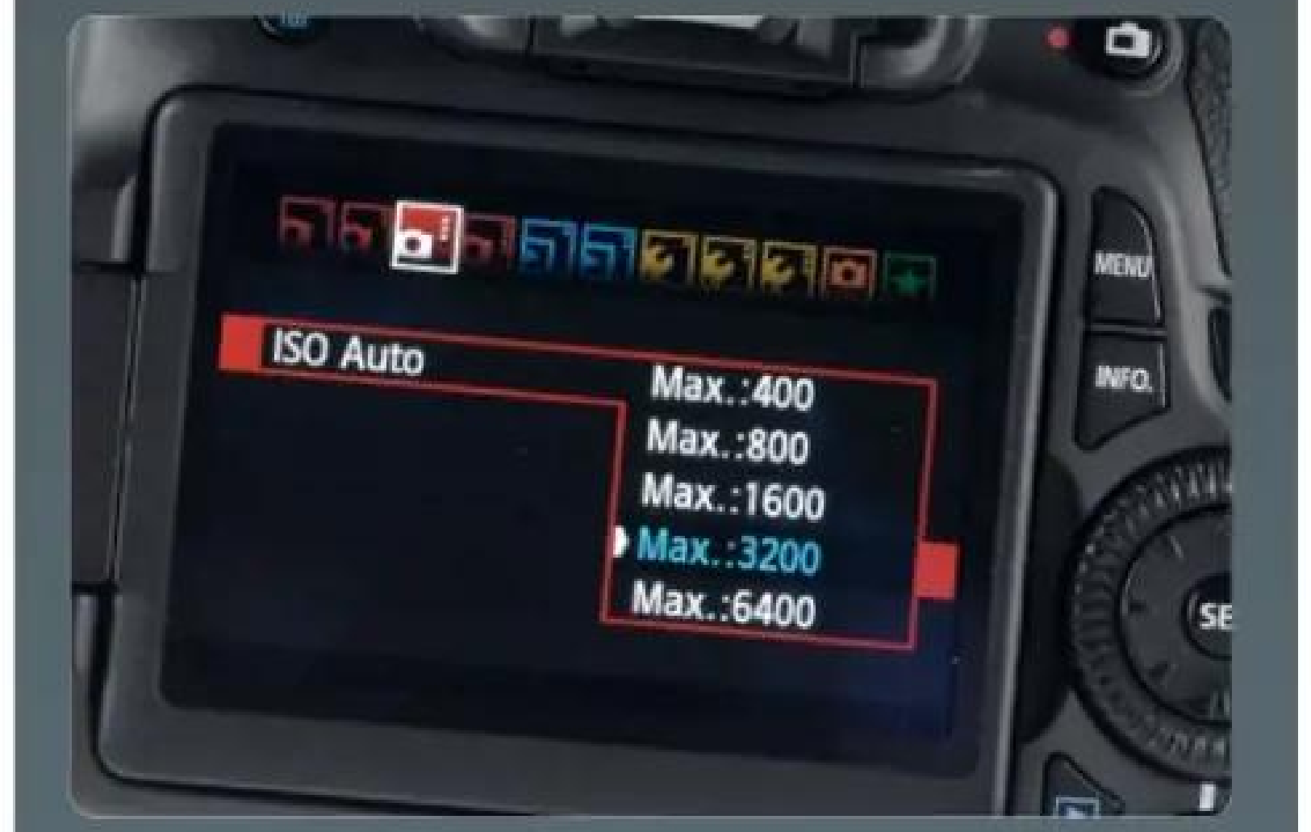
Custom ISO


C.Fn I :Exposure
ISO speed setting increments 2
0:1/3-stop
1:1-stop

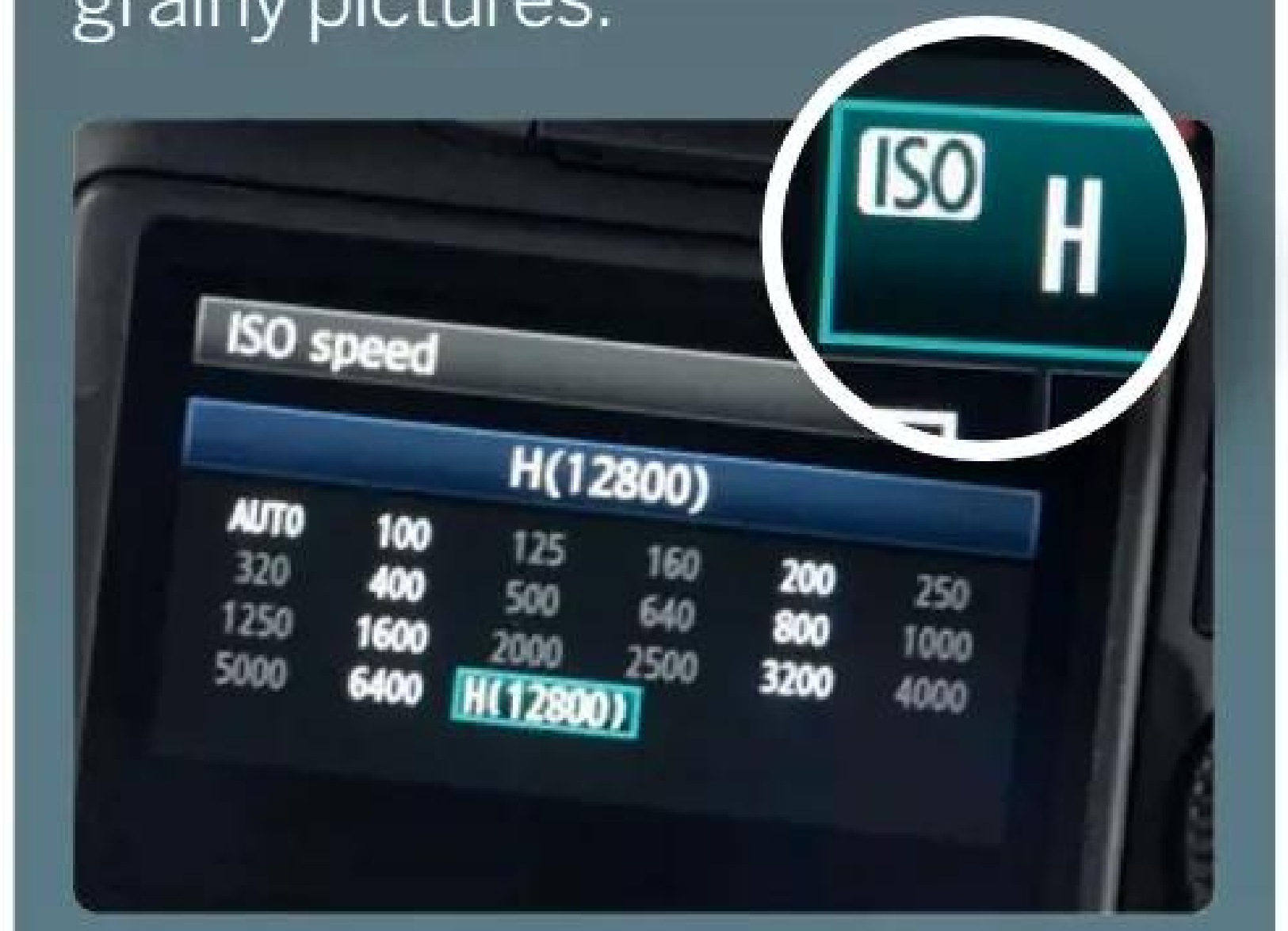
1 A Custom Function lets you choose between full-stop or one-third-stop steps between each ISO setting. Using the full stop scale means you can make big changes quicker!


ISO AUTO
Av
F6.3
-3..2..1..0..1..2..+3
-1
AWB
MF
RAW+L
ISO speed
INFO.

2 Some DSLRs offer an Auto ISO setting that sets the ISO sensitivity for you. This is ideal for handheld shooting...


ISO Auto
Max.:400
Max.:800
Max.:1600
Max.:3200
Max.:6400

3 A recent feature on EOS models is the ability to set the maximum ISO used by Auto ISO in the Menu options. This is good for avoiding unexpected grainy pictures.


ISO speed
H(12800)
AUTO 100 125 160 200 250
320 400 500 640 800 1000
1250 1600 2000 2500 3200 4000
5000 6400 H(12800)

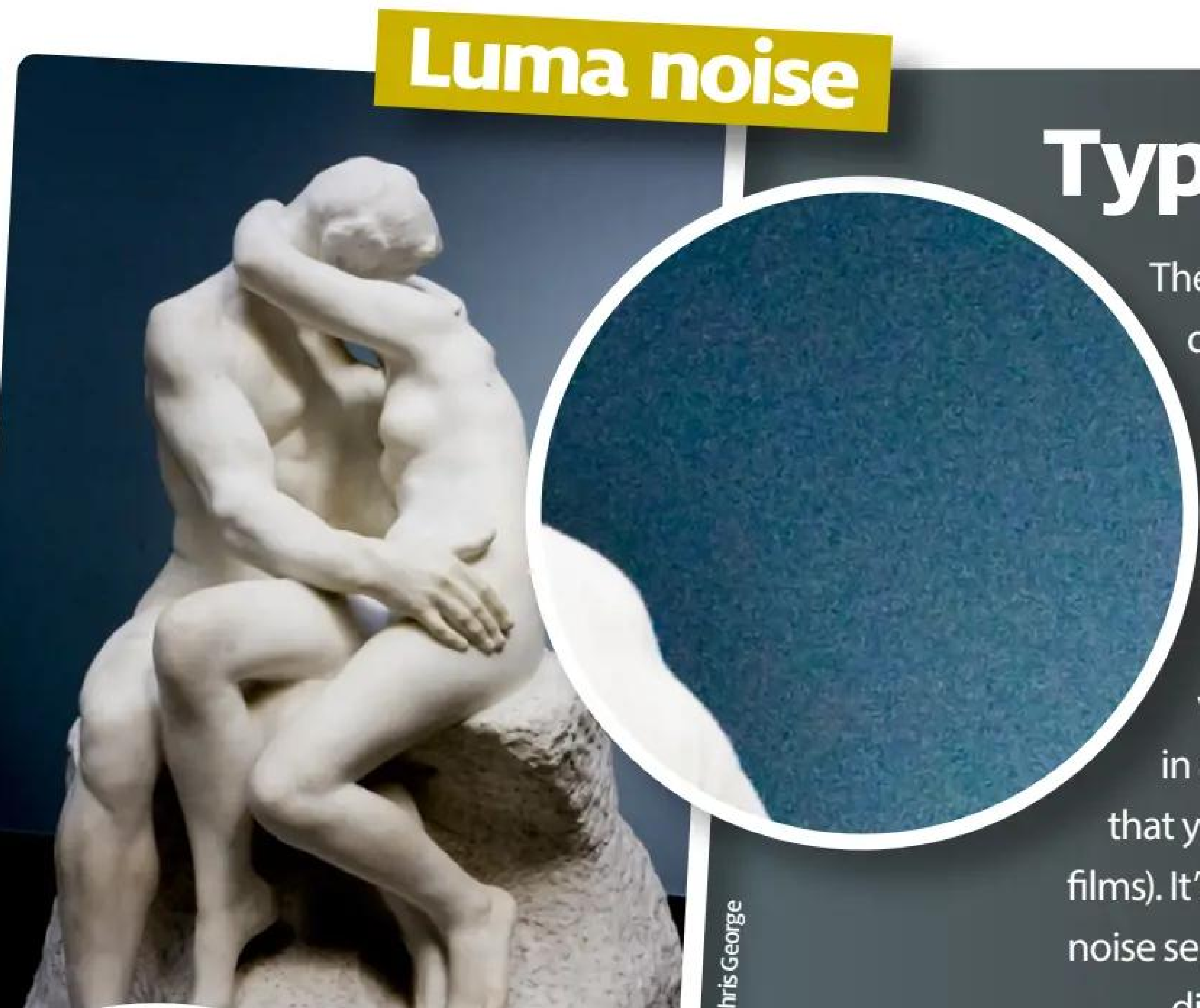
4 Your SLRs topmost ISO setting (or settings) may be labelled H (High) – and only be accessed by enabling the 'ISO Expansion' option in your camera's Custom Functions.

custom option called 'ISO Expansion'. The reason for this is that each time you increase the ISO setting, you also get a small decrease in image quality. Boosting the picture signal also amplifies impurities in the signal known as 'noise'. This noise shows up as grain and colour mottling in the image – and this gets progressively more noticeable the higher the ISO is set. Canon simply suggests that the highest ISO speeds produce so much noise that they should be used with caution!

When to increase ISO

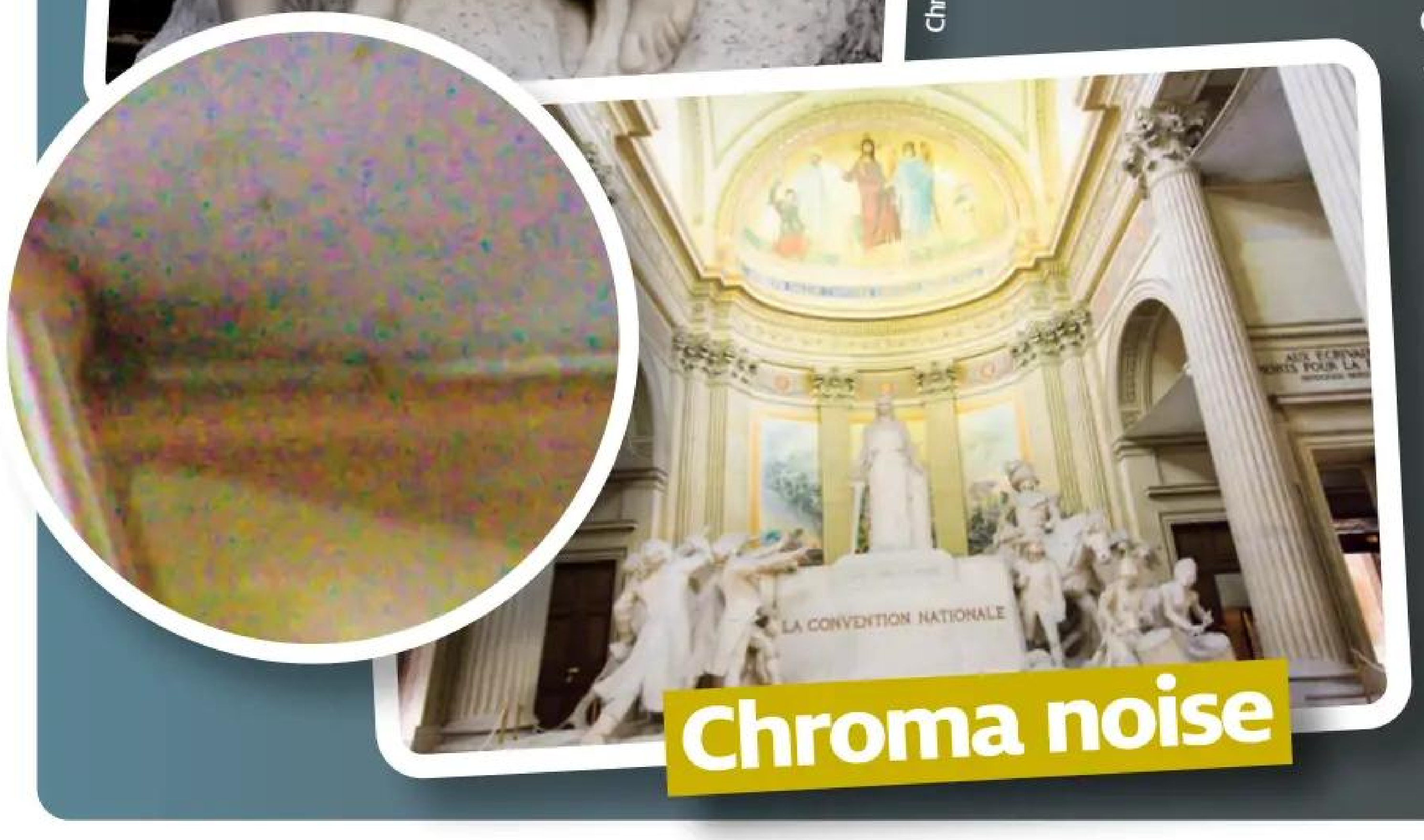
Some photographers try to resist increasing the ISO at all costs in search of getting the best, grain-free images. However, pumping up the ISO often actually increases image quality overall, as this simple change lets you use a faster shutter speed – thereby eliminating camera shake. A grainy picture is always better than a blurry one! A higher ISO can also enable you use a narrower aperture – increasing depth of field, and thus increasing the resolution of a lens – to give you sharper-looking pictures.

Although higher ISO settings are invaluable in low light, they are not essential



Luma noise

Chris George



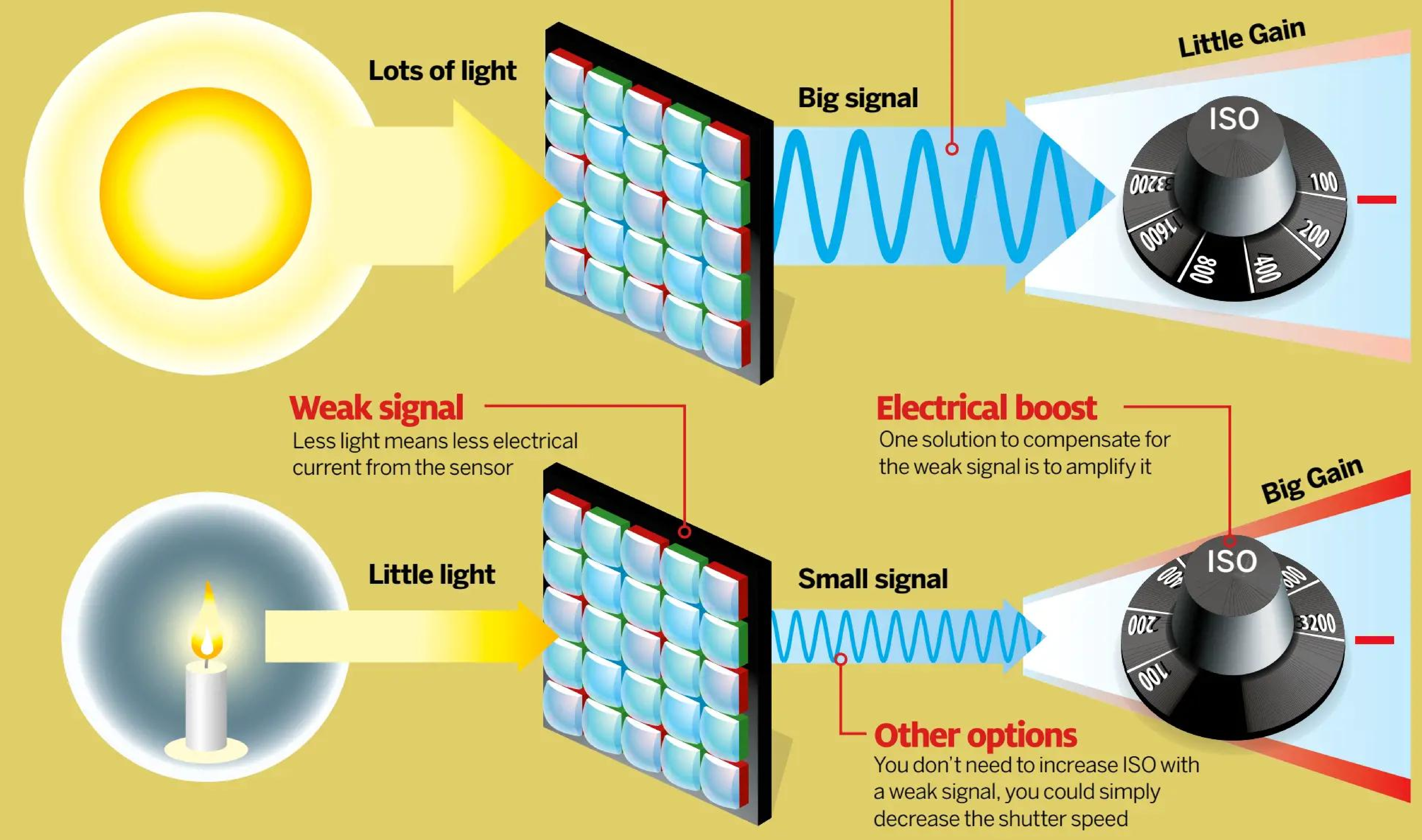
Chroma noise

Types of noise

There are two different types of noise found in digital images. Luminance noise shows up as a speckled pattern, like specks of black sand, and is similar to the grain that was found when using high-ISO black-and-white films. Chromatic noise is coloured and looks like the rainbow-like sheen when looking at a patch of oil (and is similar in appearance to the blotchy dye patterns that you saw when enlarging high-ISO colour films). It's important to look at these two types of noise separately – as each can be reduced using different tools during the editing stage. These are often provided as separate noise-reduction sliders by a RAW converter (such as in Adobe Photoshop's Camera Raw utility). Specialist software (such as Noise Ninja (www.picturecode.com) and Dfine (www.niksoftware.com) is particularly useful for reducing noise without sacrificing detail.

Pumping up the volume

ISO adjusts for low light by amplifying the sensor output



Strong current
Stronger light creates more electrical signal from the sensor, so less amplification or 'gain' is needed

Weak signal
Less light means less electrical current from the sensor

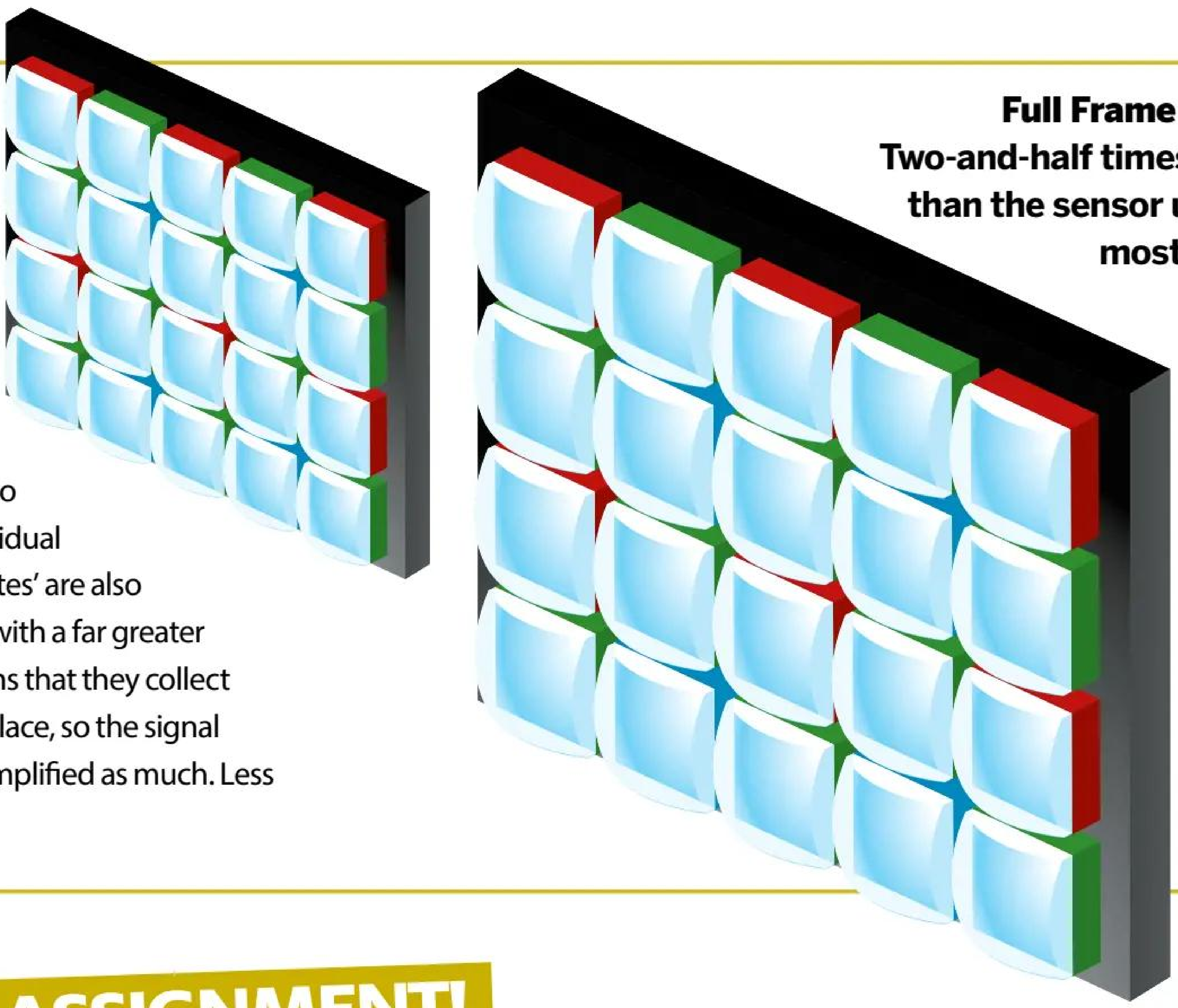
Electrical boost
One solution to compensate for the weak signal is to amplify it

Other options
You don't need to increase ISO with a weak signal, you could simply decrease the shutter speed

The full frame advantage

The bigger the sensor that your camera uses, the less noise that you will get. Canon digital SLRs use three different sizes of sensor. Models in the EOS 5D and 1Ds families have the largest 'full-frame' sensors. EOS-1D SLRs use slightly smaller 'APS-H'-sized sensors. All other cameras (including all the best-selling models), use the smallest 'APS-C' sensors.

The reason that a full-frame SLR (such as a 5D Mk II) gives an image with less noise than an APS-C model (such as the EOS 50D) is that as the sensor is so much bigger, the individual light-sensitive 'photosites' are also substantially bigger – with a far greater surface area. This means that they collect more light in the first place, so the signal does not need to be amplified as much. Less gain equals less grain!



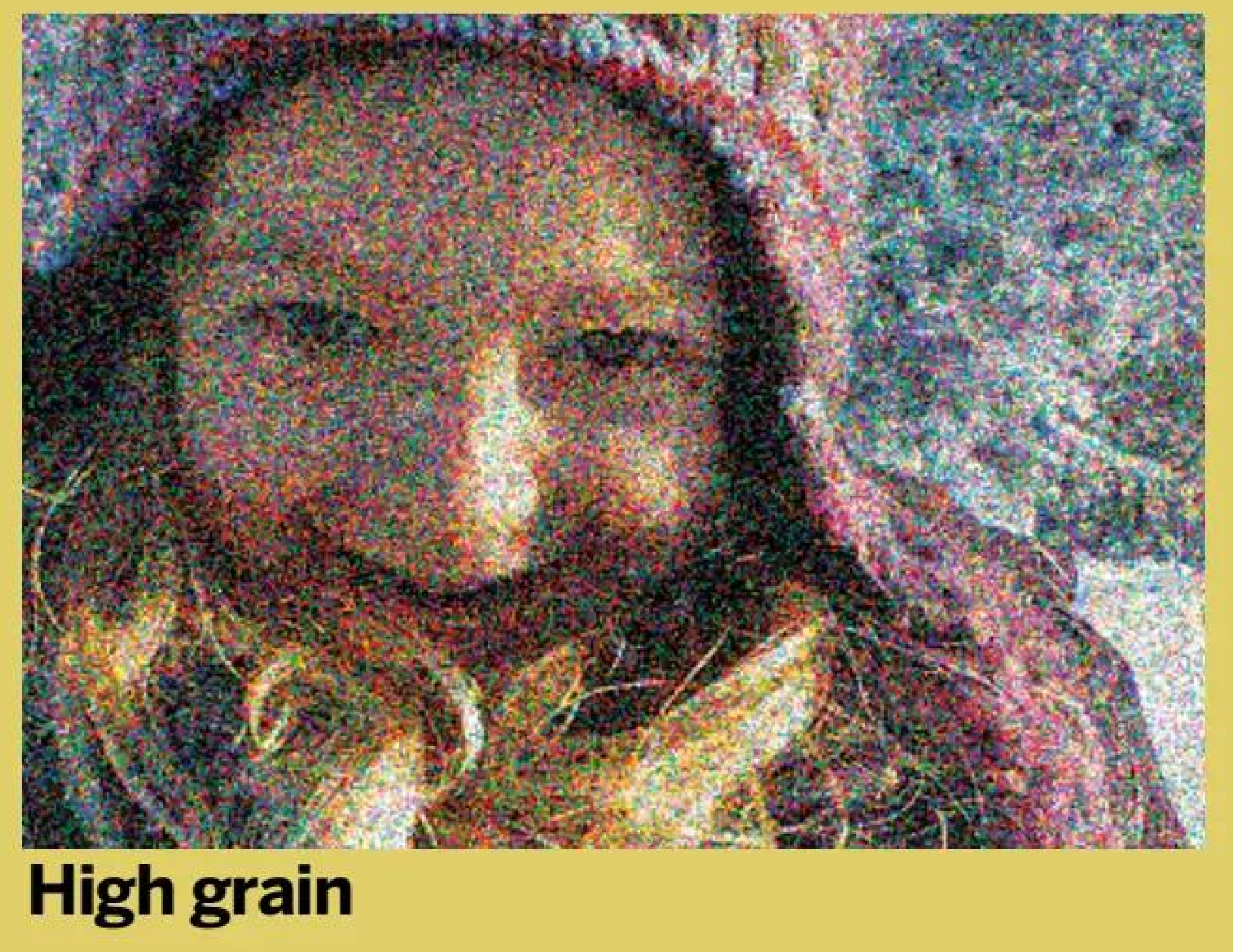
APS-C sensor only 40% of size of full-frame sensor

Full Frame sensor Two-and-half times larger than the sensor used by most Canon DSLRs

for all low-light situations, in fact, if you can keep the camera steady, they are often best avoided. If you are using a solid tripod, the slowest ISO setting (ISO100) is usually the best option – as you can then use a longer shutter speed to make up for the lack of light. Similarly, if you are using flash, high-ISO settings are not needed (although increasing the ISO will increase the effective range of your flash).

Gain = grain The less the signal is amplified by the gain circuitry, the cleaner the picture and the less grain in the image

Low grain



High grain

YOUR ASSIGNMENT!

How good is your EOS at high ISO?

Lots of photographers are scared of grain, and deliberately avoid using high-ISO settings. But often the grain is nowhere near as noticeable as you might think. In this exercise, you are going to find out for yourself which settings *you* think give acceptable-looking results with *your* DSLR.

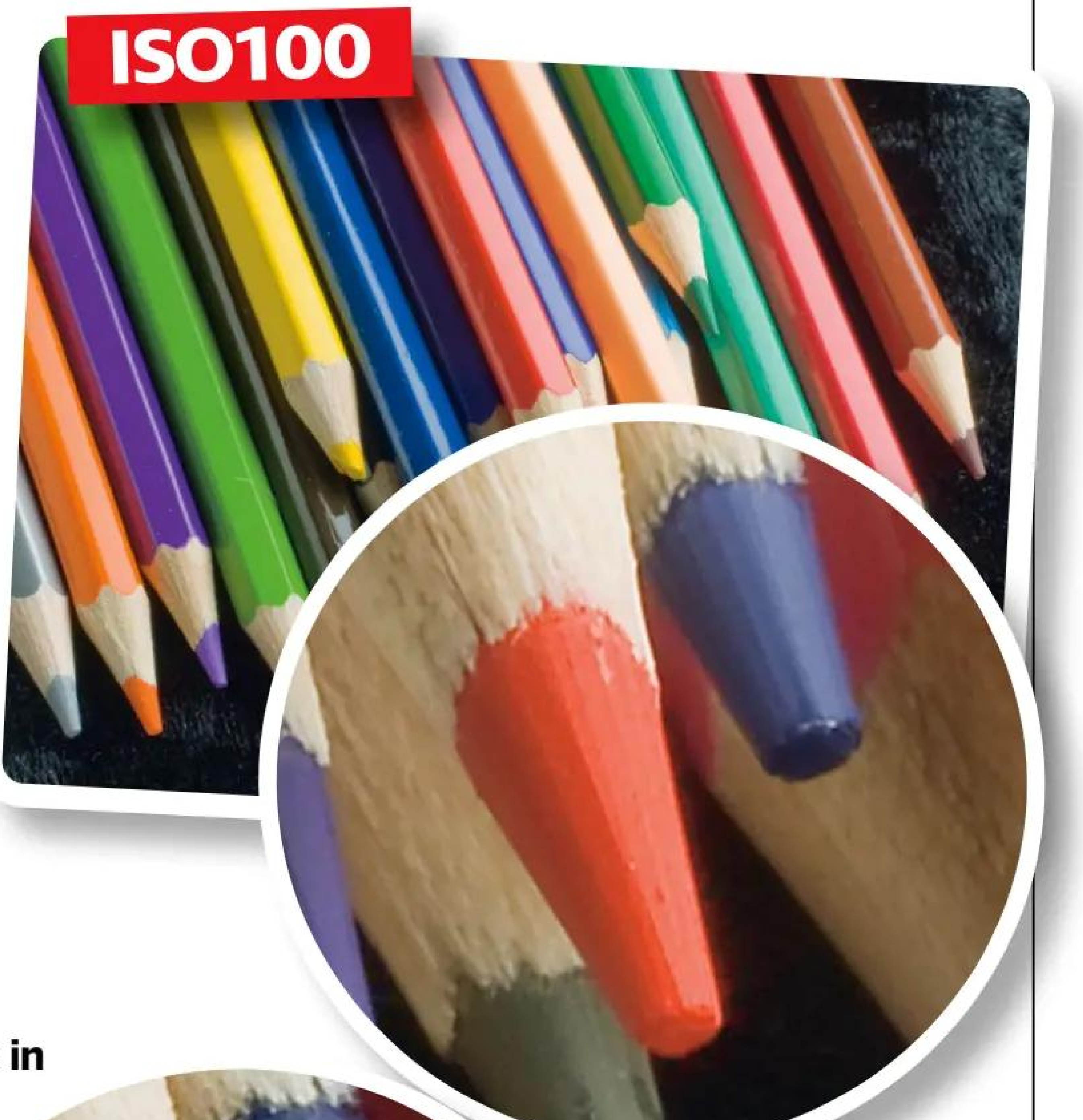
1 **Ensure that ISO Expansion is enabled in your Custom Functions (if available on your EOS).**

2 **Set up a still life near a window indoors in daylight. Pick a subject with a good range of colours, detail and a decent expanse of black (we arranged some pencils on a black velvet jacket).**

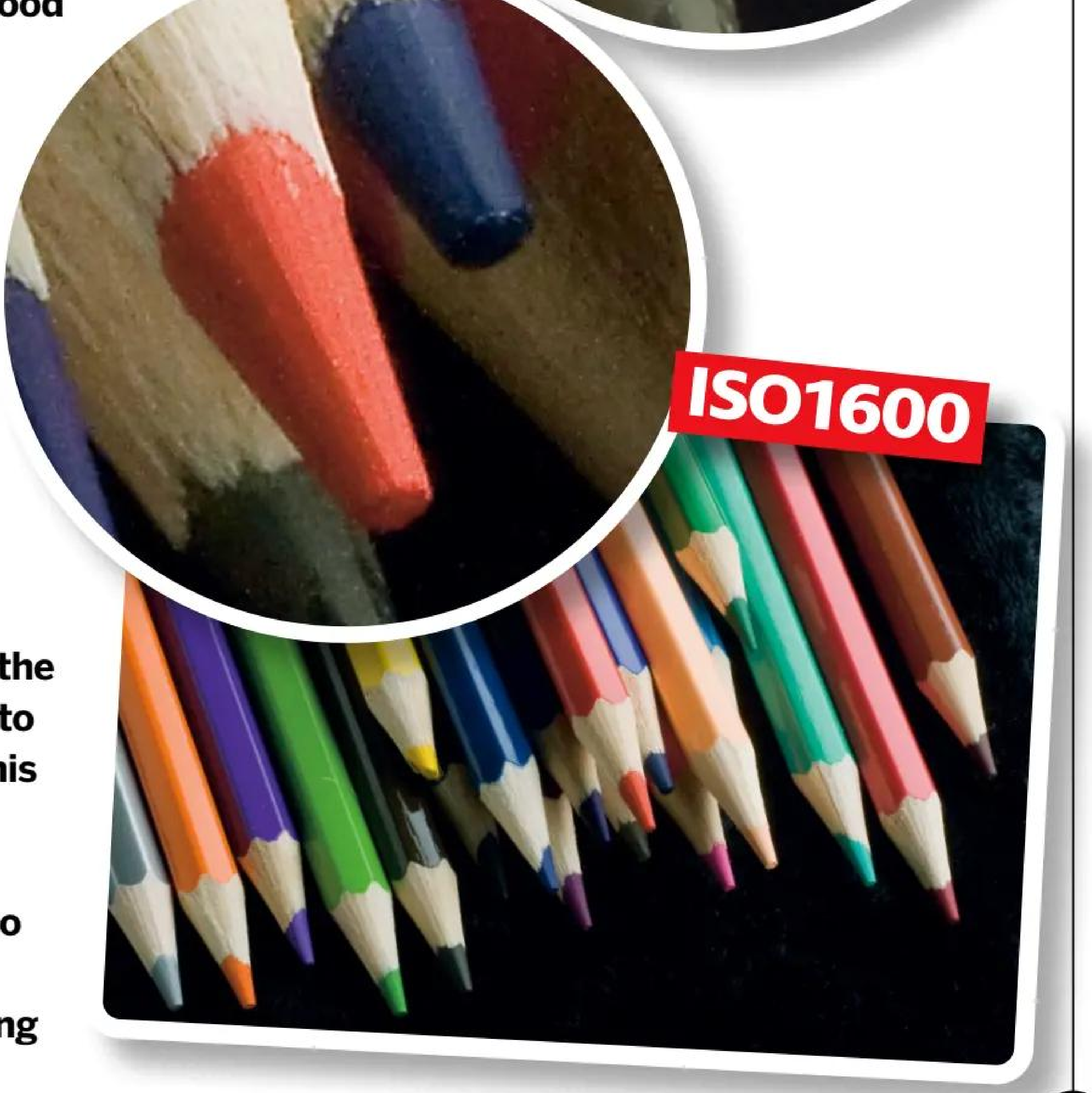
3 **With you camera on an tripod (to rule out the effects of camera shake), take a series of shots at all the full-stop ISO settings your camera offers (100, 200, 400, 800 etc).**

4 **Look at your shots carefully on the computer, zooming in at 100% to look at the grain. At what ISO does this look unacceptable?**

5 **Check your Custom Functions to see what the High ISO Noise Reduction is set to. Change the setting and repeat the whole exercise.**



ISO100



ISO1600

LESSON 12

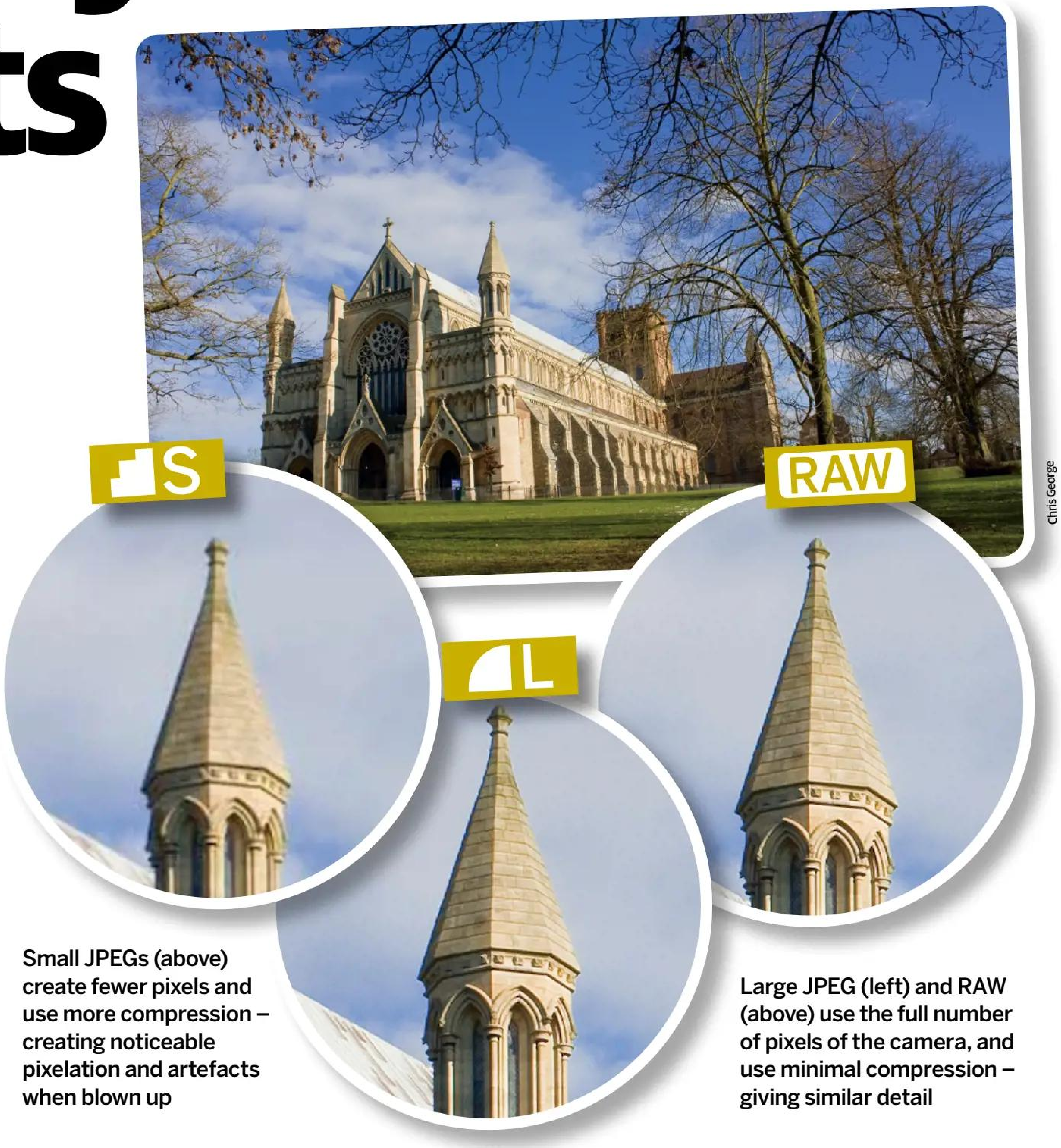
Memory & formats

Your Canon SLR allows you to record your stills images in two different file types – RAW or JPEG. But if you switch between the two using your SLR's Quality menu you will see a wide range of different options. S or M, pieces of pie, staircase icons – what does all this mean?

JPEG is the world's most popular digital image format – and has the huge advantage that these files can be opened by a myriad of different computer programs with no effort or conversion. Named after the Joint Photographic Experts Group that produced it, the JPEG also has the advantage that the file size is completely scalable. Images can be compressed so that the file size is smaller – a property that is particularly useful on the web, or with email. Unfortunately, compression comes at a price – the more compressed a file is, the more the image quality deteriorates – creating visible squares and other artefacts in your pictures. On your EOS SLR, you just get two different levels of compression to choose from – the highest quality symbolised by a piece of pie ◢ and the lower-quality smaller-file-size option symbolised by the staircase-shaped ▟ icon.

Pixel count

In addition to this, your camera gives you a choice as to how many pixels you want your picture to be constructed of. To choose the maximum number your sensor allows select Large (L). For half this ▶



Chris George

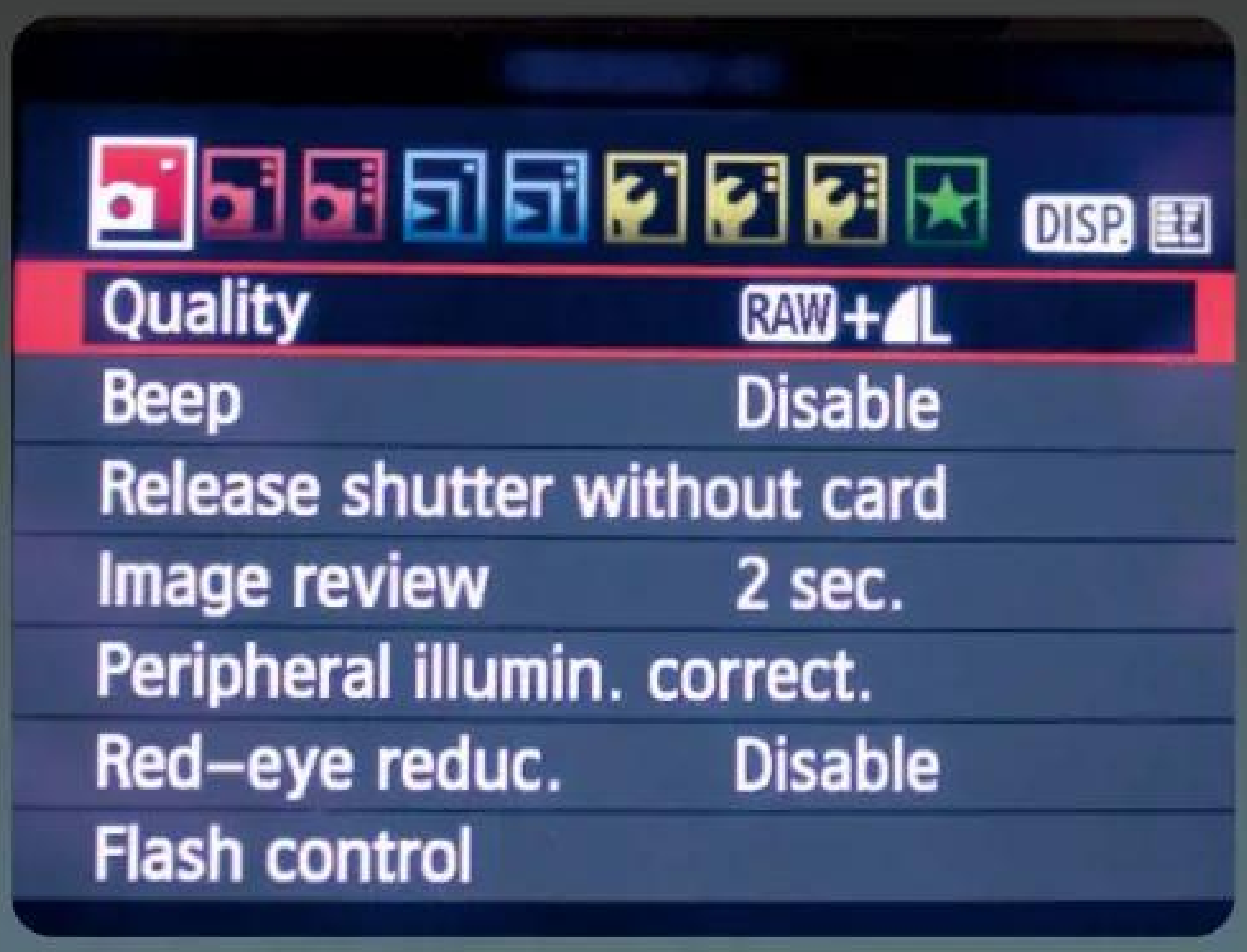
Small JPEGs (above) create fewer pixels and use more compression – creating noticeable pixelation and artefacts when blown up

Large JPEG (left) and RAW (above) use the full number of pixels of the camera, and use minimal compression – giving similar detail

STEP BY STEP

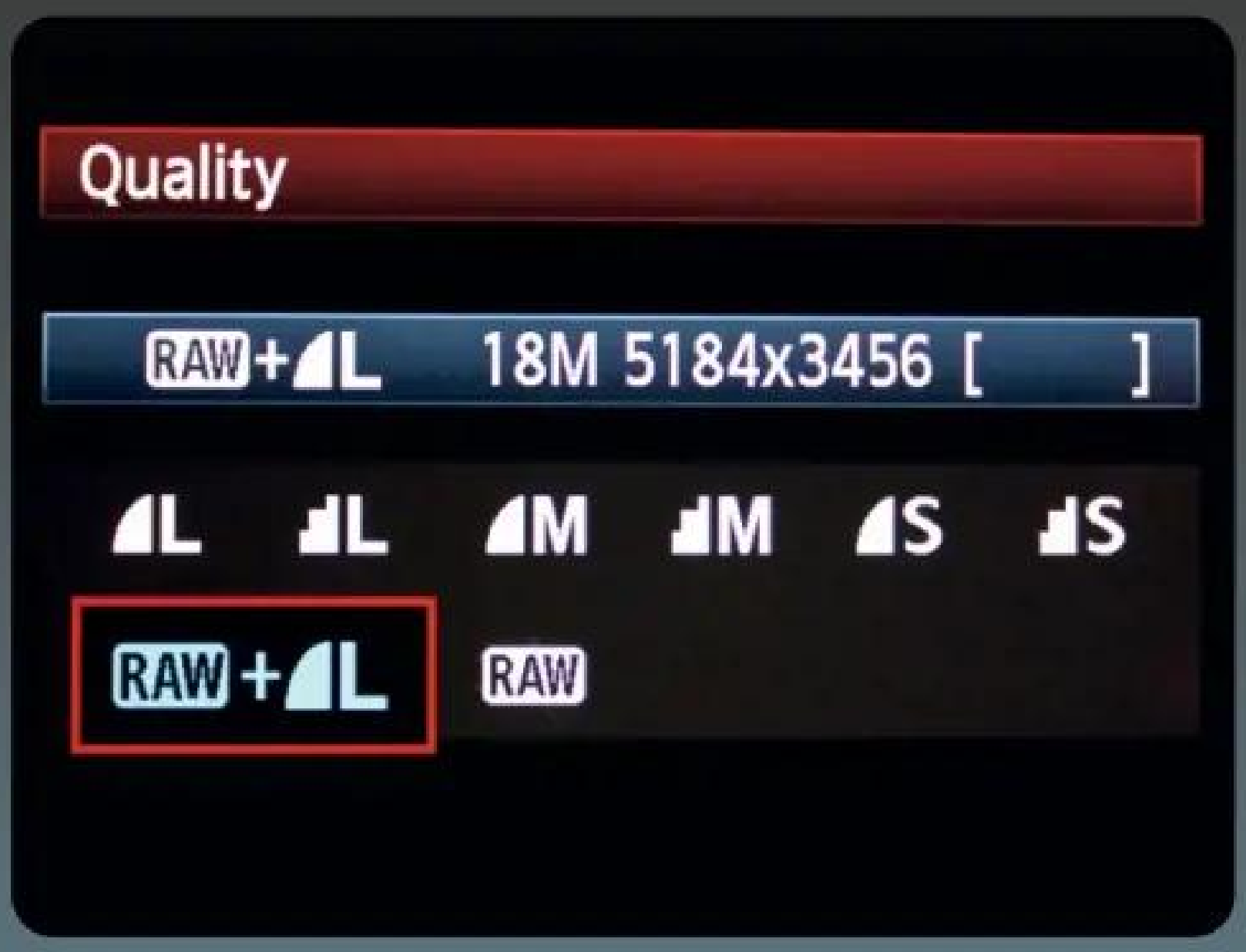
Beginners' guide to setting RAW

1 Your camera will come set to record in JPEG. If you want to try RAW, you need to press the Menu button.



Quality RAW+◢L
Beep Disable
Release shutter without card
Image review 2 sec.
Peripheral illumin. correct.
Red-eye reduc. Disable
Flash control

2 Look through the tabs or options until you find the one that is labelled 'Quality', then press the Set button.



Quality

RAW+◢L 18M 5184x3456 [ ]

◢L ▟L ◢M ▟M ◢S ▟S

RAW+◢L RAW

3 The number of options available varies from SLR to SLR. Choose either RAW alone, or RAW plus Large JPEG.

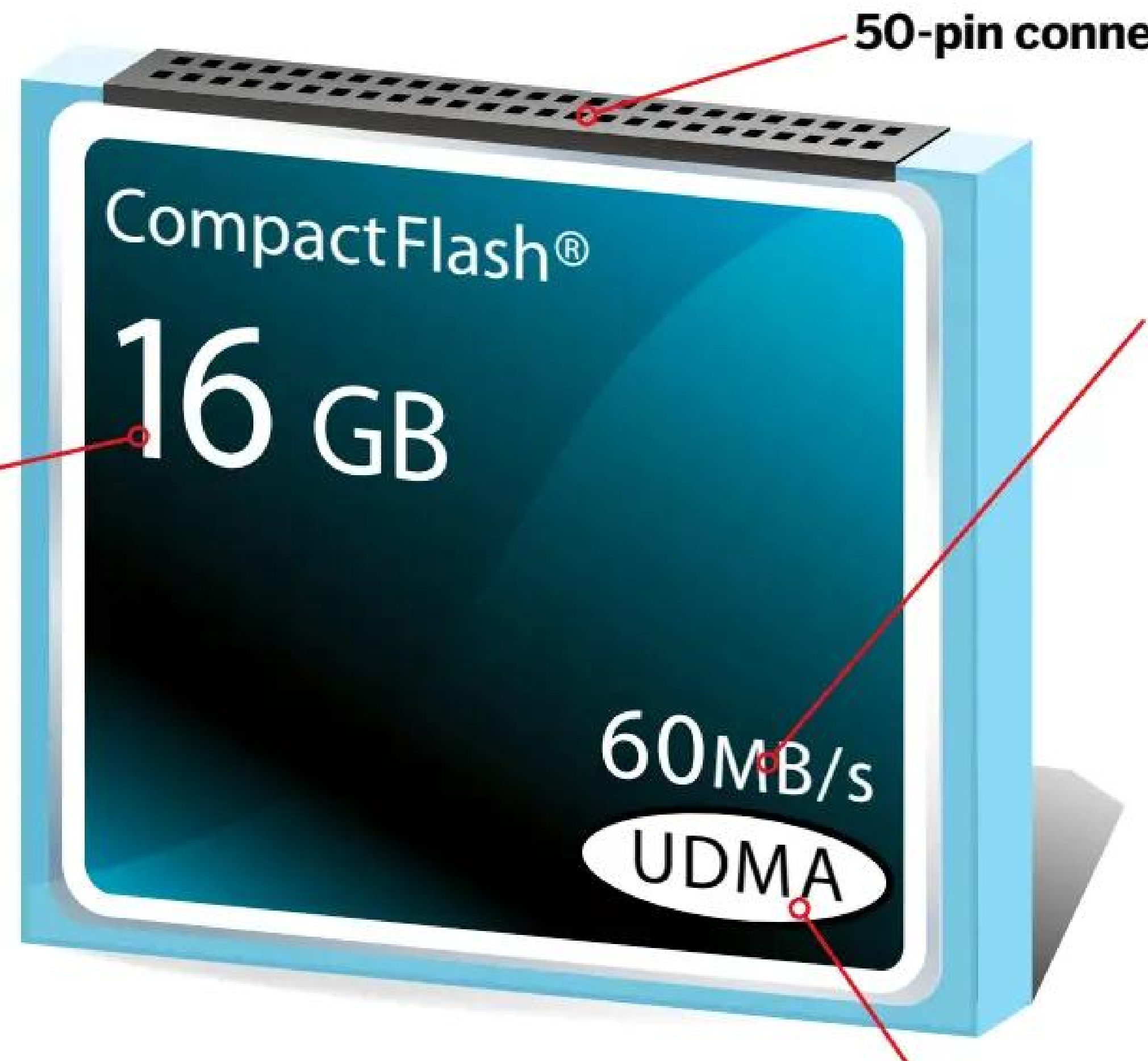
4 When you have highlighted the option that you want, then press the Set button to ensure your choice is activated.

Making sense of the numbers

Memory cards come in lots of sizes, speeds and classes...

CompactFlash

The traditional DSLR memory card comes in two thicknesses – 3.3mm (Class I) or 5mm (Class II). Both will fit EOS cameras using the CF format – but every card you buy nowadays will be the thinner type.



50-pin connector

Capacity
Storage space is measured in gigabytes (GB). Older cards may be measured in megabytes (MB); 1024MB equals 1GB

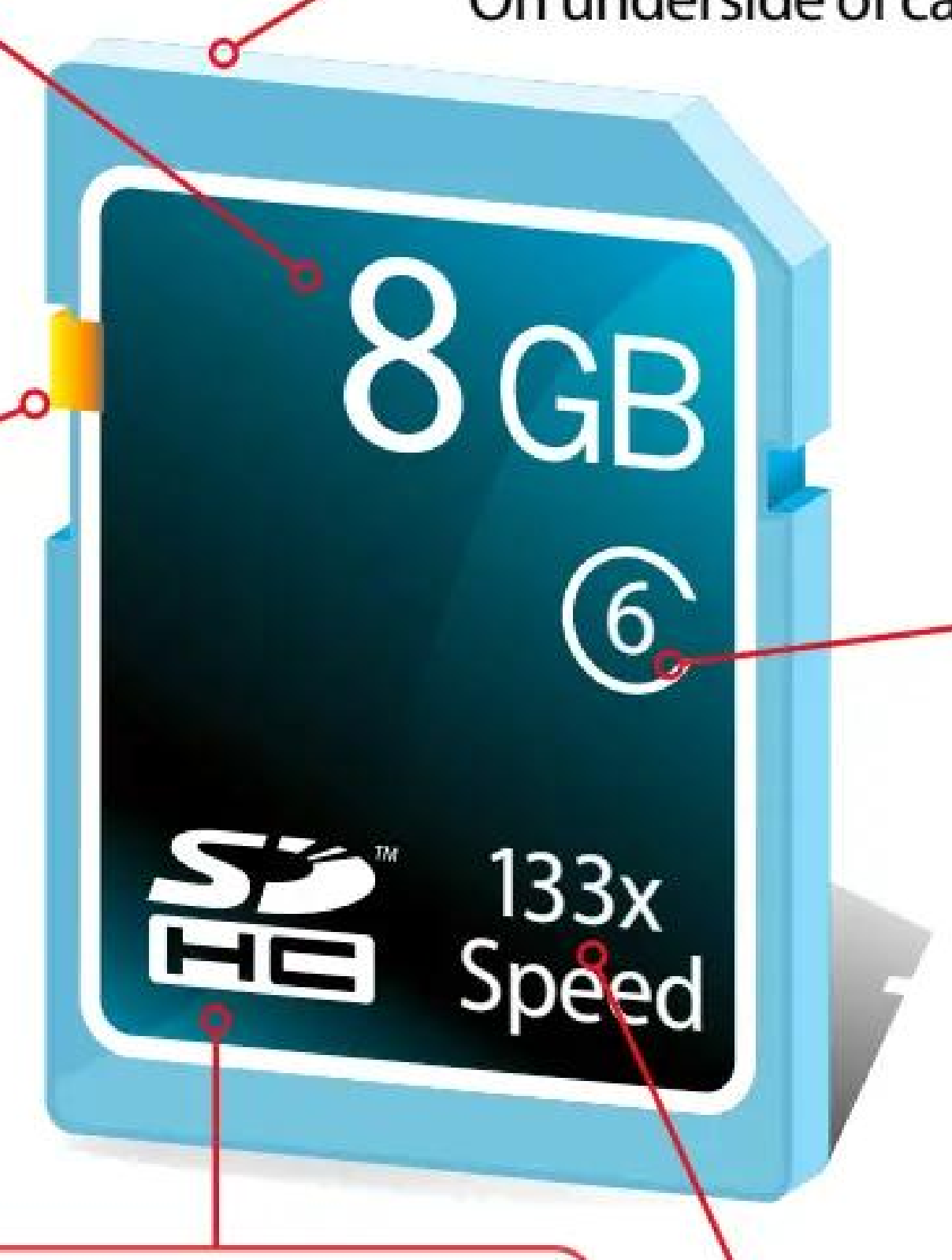
Transfer speed
The faster the speed the better the performance at continuous shooting, for stills or video. The maximum data transfer speed is often measured in megabytes per second (MB/s)

UDMA
The latest generation of CompactFlash with the fastest transfer speeds use the UDMA (ultra direct memory access) protocol

SD

Now the most popular memory card format and smaller than CompactFlash, it comes in three types – SD, SDHC & SDXC (see below).

Gold-plated contacts
On underside of card



Lock
Slide down so data cannot be added to or deleted from card

Class
SD cards now come in different classes, designed to give you an idea of sustained write speed (which is important when recording video). A Class 2 card will deliver a write speed of at least 2MB/s; a Class 6 card (as in diagram) gives a performance of at least 6MB/s, and a Class 10 card offers speeds of over 10MB/s

Transfer speed
Some cards measure data transfer as an 'x factor' rather than in MB/s. 133x is equivalent to 20MB/s. See table, above right

SD The Secure Digital (SD) card is the most popular type of flash memory format. Older, original, cards have a maximum capacity of 2GB

SDHC The newer High Capacity (HC) SD card is much more useful for DSLR users, as it offers capacities of up to 32GB. First used as the main memory card type in the EOS 450D (Rebel XSi)

SDXC The newly launched eXtended Capacity version of the card will offer capacities of up to two terabytes (2,000GB). These only work in the latest EOS 550D, 600D and 60D models

HOW MANY SHOTS FIT ON A CARD?

The capacity will depend on the shot size, the file quality setting, and the SLR used…

	6 MEGAPIXEL		12 MEGAPIXEL		18 MEGAPIXEL	
2GB	RAW	256	RAW	120	RAW	75
	◢L	608	◢L	460	◢L	285
	▟S	2,112	▟S	2,290	▟S	1,590
8GB	RAW	1,024	RAW	480	RAW	300
	◢L	2,432	◢L	1,840	◢L	1,040
	▟S	8,448	▟S	9,160	▟S	6,360
32GB	Larger cards		RAW	1,920	RAW	1,200
	not compatible		◢L	7,360	◢L	4,160
	with older SLRs		▟S	36,640	▟S	25,440

Dual fuel

EOS models in the 1D family offer both CompactFlash and SDHC card slots. You can choose which you use – or use both simultaneously, to create automatic backups with the same or different file formats. This handy pro feature was introduced with the Mark II models in the 1D and 1Ds ranges.

SPEEDS COMPARED

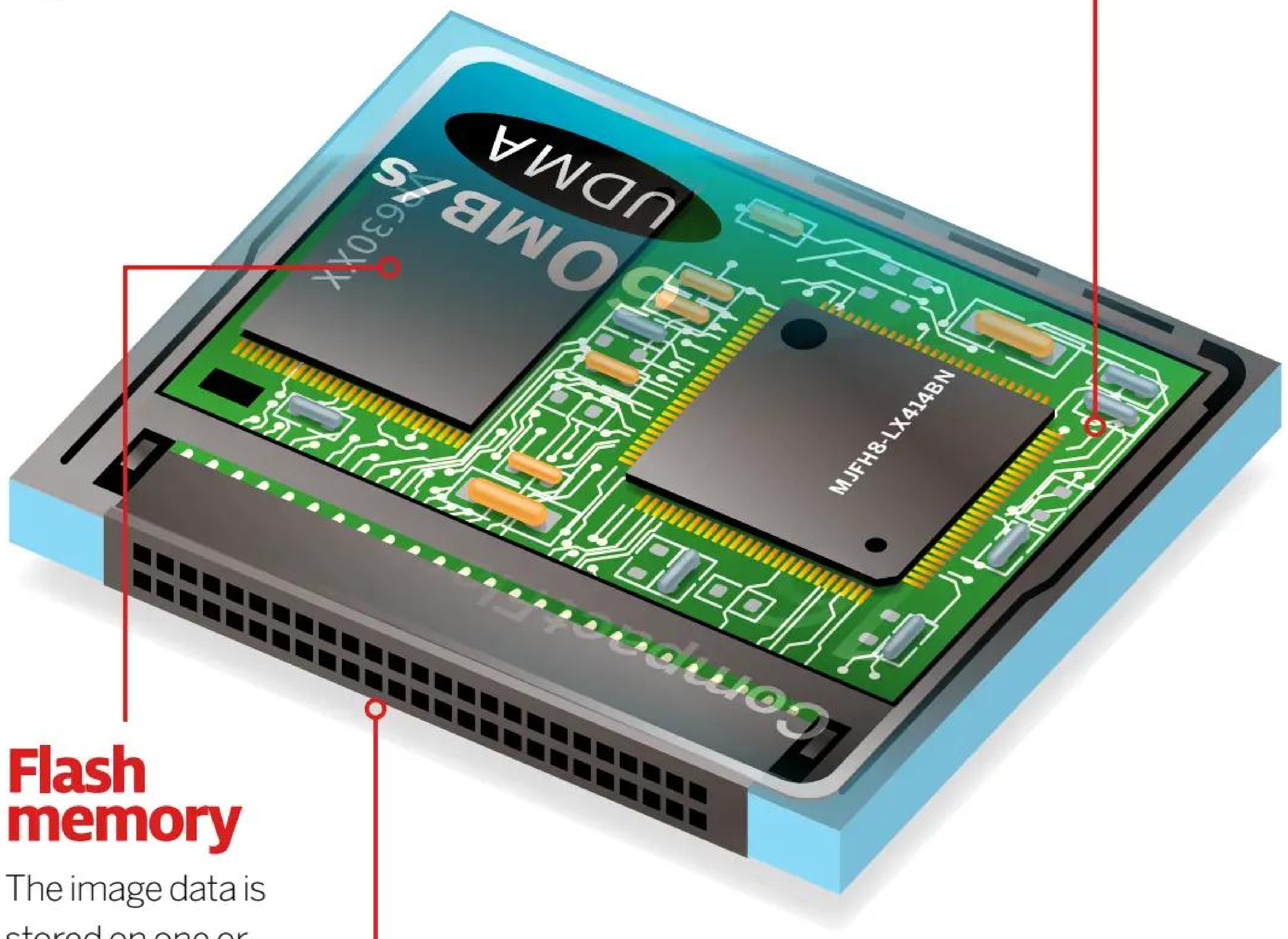
40x	6MB/s
66x	10MB/s
100x	15MB/s
133x	20MB/s
200x	30MB/s
300x	45MB/s
400x	60MB/s
600x	90MB/s

Anatomy of a flash card

Inside the casing of a CompactFlash card

Chips with everything

A memory card is packed full with a surprising amount of electronics. It is the job of the main controller to regulate the flow of data between the card and camera

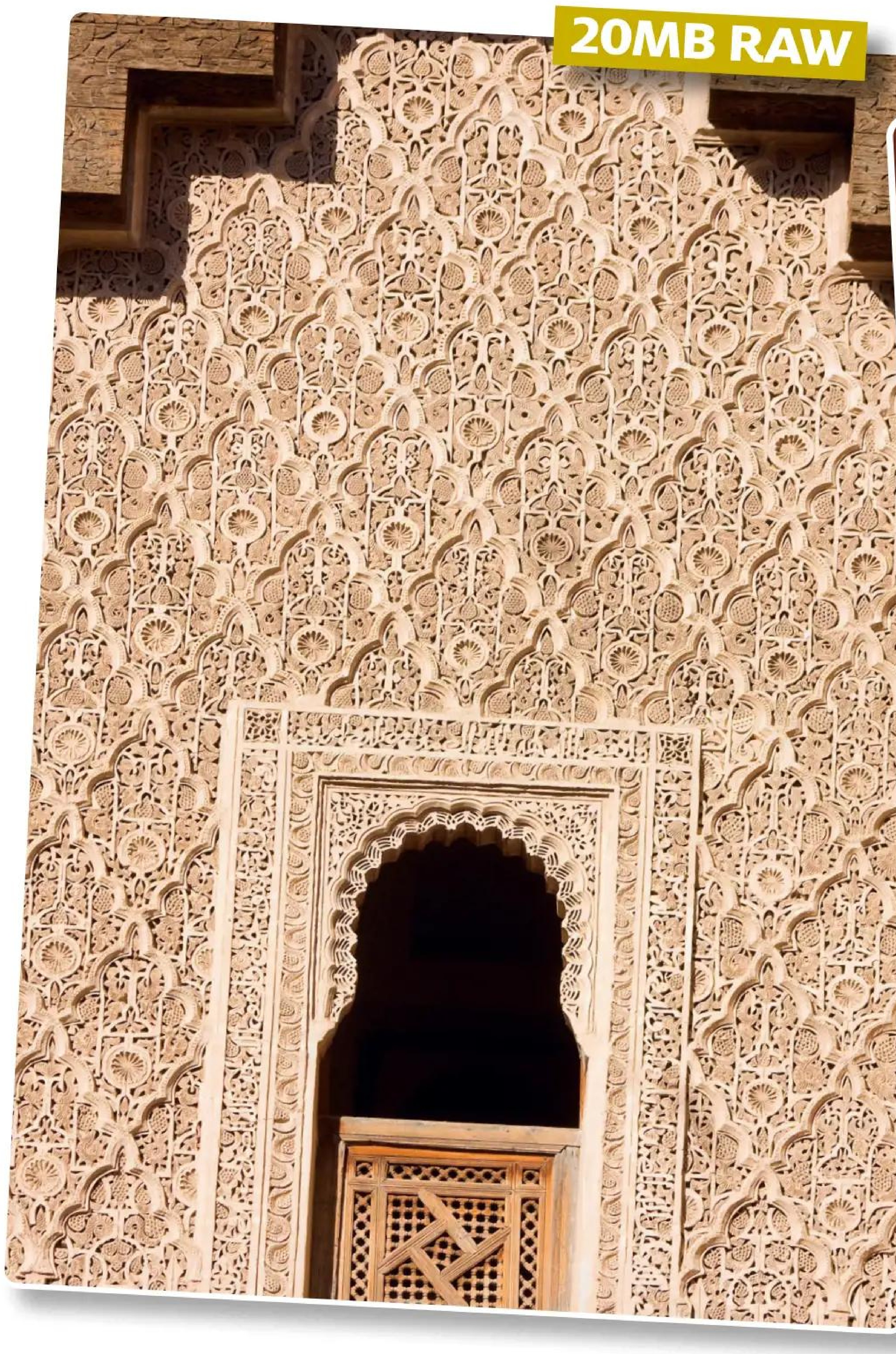


Flash memory

The image data is stored on one or more flash memory chips inside the card

50-pin connector

50 pins in the camera or card reader slot into holes in the card. The pins can get bent if the card is inserted incorrectly, and this can be expensive to repair



The size of a RAW file varies depending on the detail the shot contains. This architectural detail, therefore, creates a file that is twice the size of the simple sunset

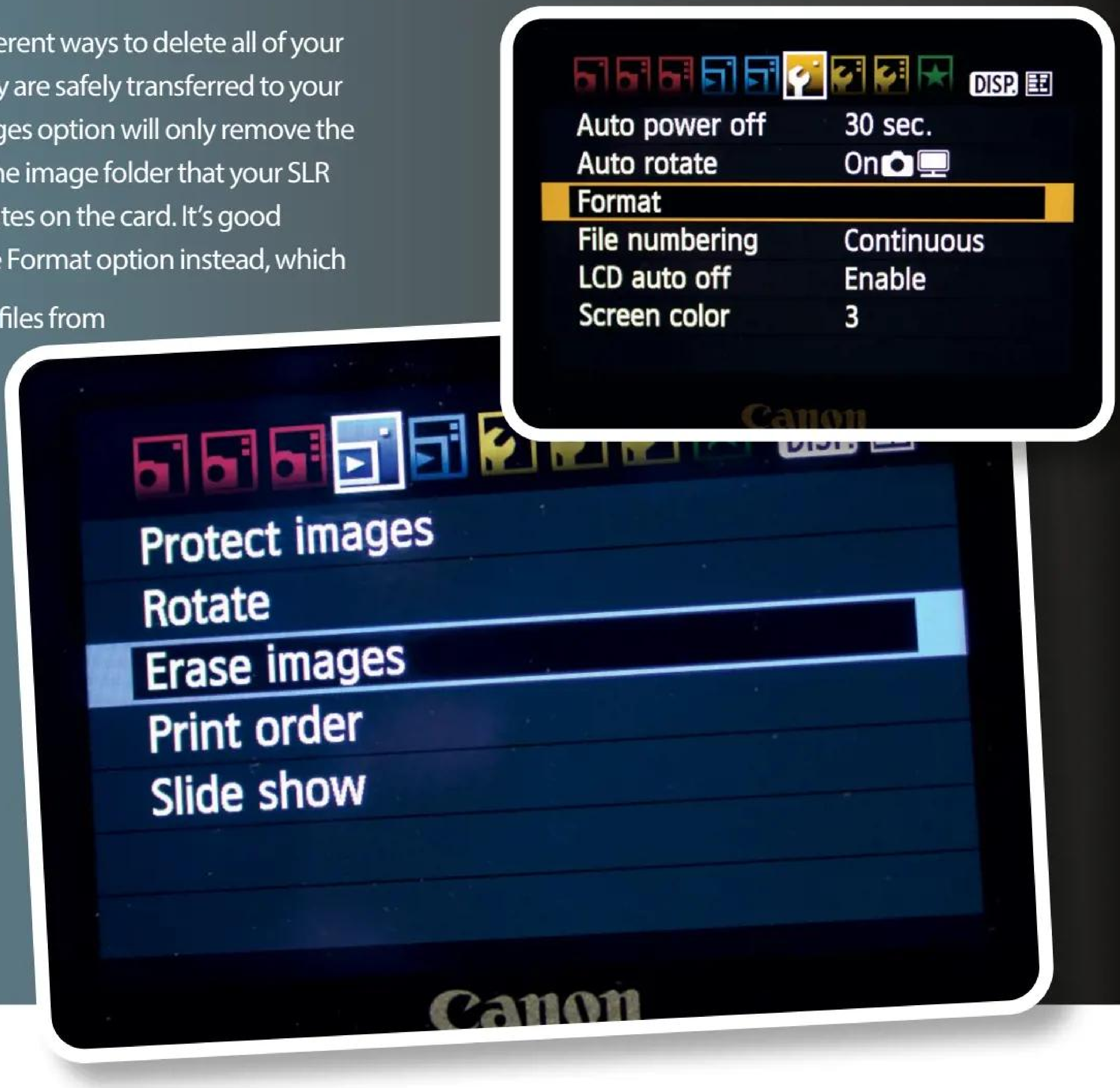
number, go for Medium (M) – or for a quarter of the maximum choose Small (S).

To get the smallest file sizes and to fit the most pictures on your card choose ◢S – and for the best-quality JPEGs go for ◢L. In almost all situations, you should really record in ◢L – or choose the superior RAW format. The RAW option uses all the sensor pixels, and uses a minimal amount of compression to create a proprietary format – which stores the data in a semi-processed state (like a digital negative). It captures significantly more tonal information than a JPEG version – which is invaluable for editing purposes, even if the difference between a RAW and ◢L files are not immediately apparent.

RAW files are considerably larger in size than ◢L JPEGs, so not only fill up your card quicker, but also take longer to process in the camera and be written to the card. For high-speed continuous shooting, therefore, you can shoot longer sequences without the buffer filling up if you switch to JPEG. The speed of the memory card will also prove critical in such situations.

Format or throw away?

There are two different ways to delete all of your pictures, once they are safely transferred to your PC. The Erase Images option will only remove the image files from the image folder that your SLR automatically creates on the card. It's good practice to use the Format option instead, which removes all of the files from the card (the card can store any digital file, just like a USB memory stick).



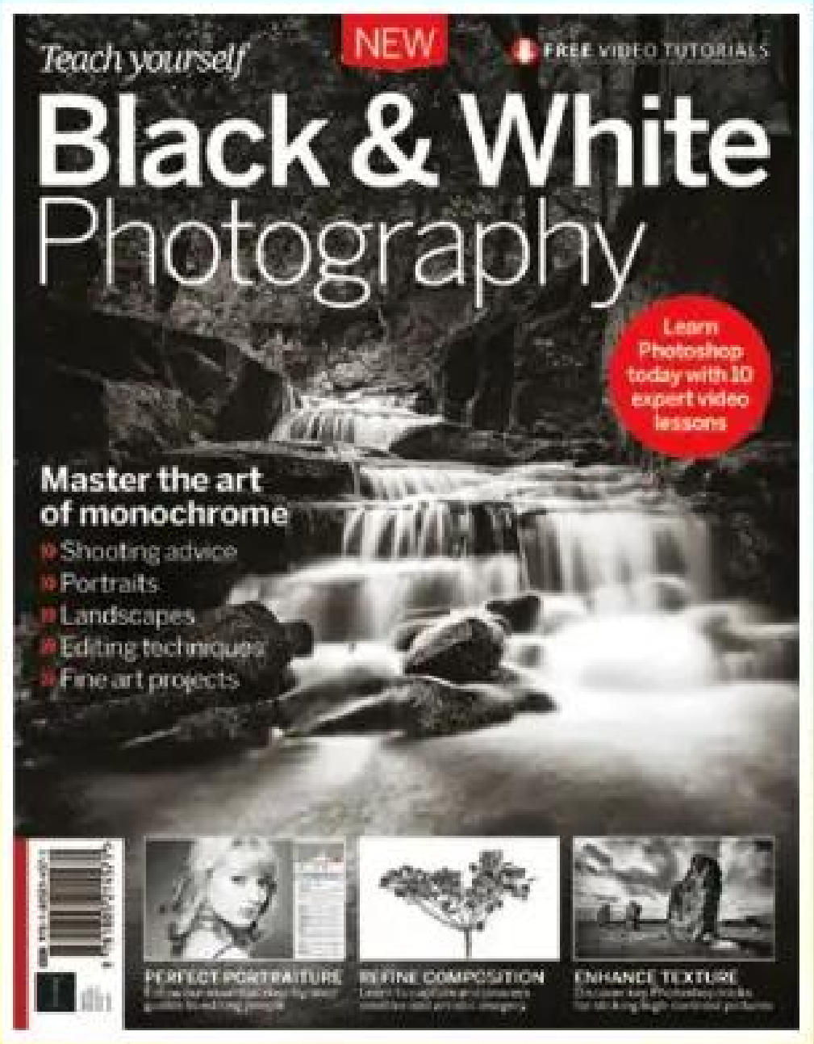
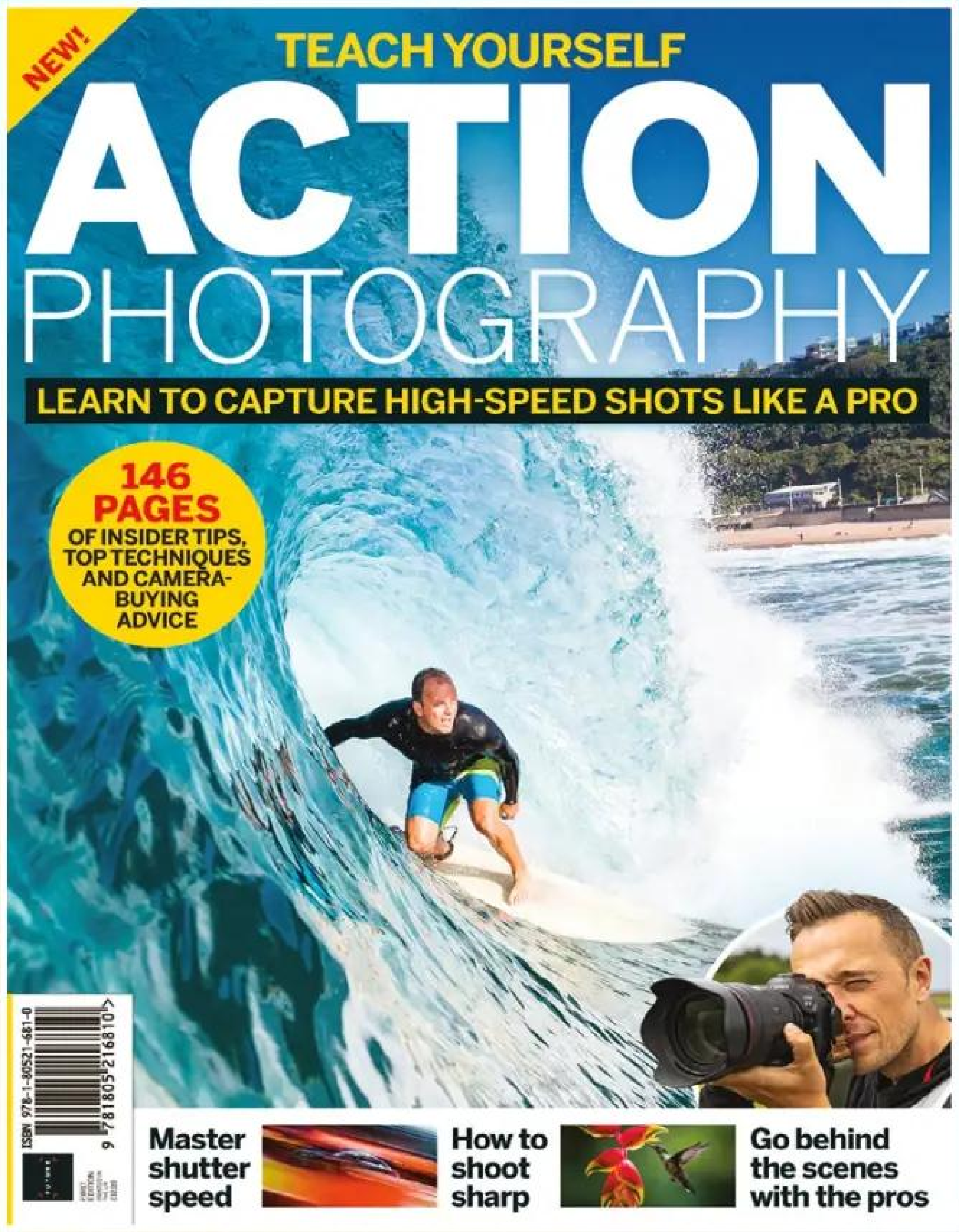
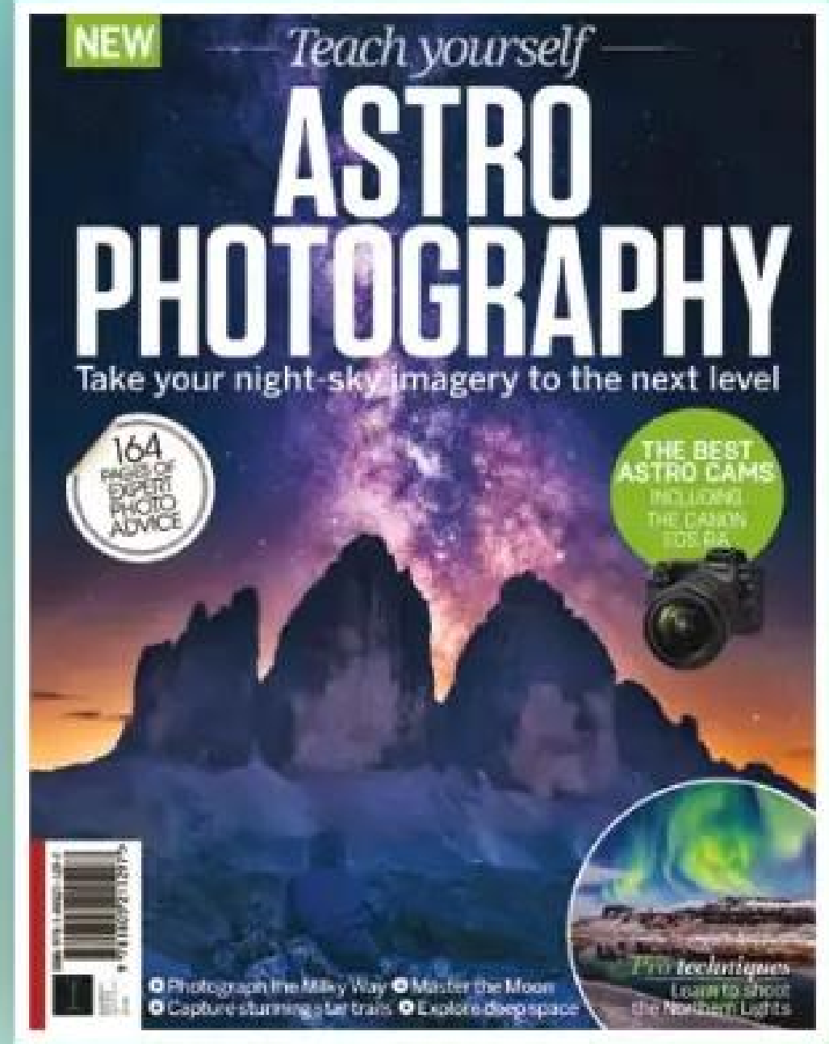
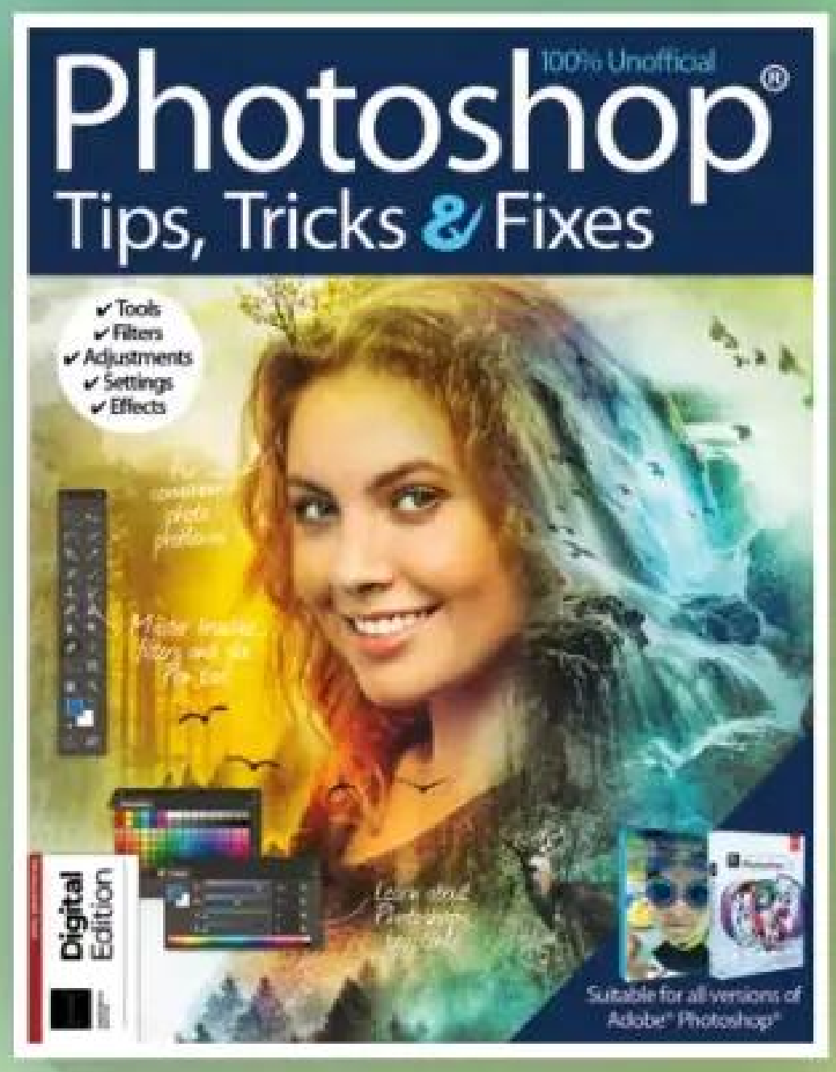
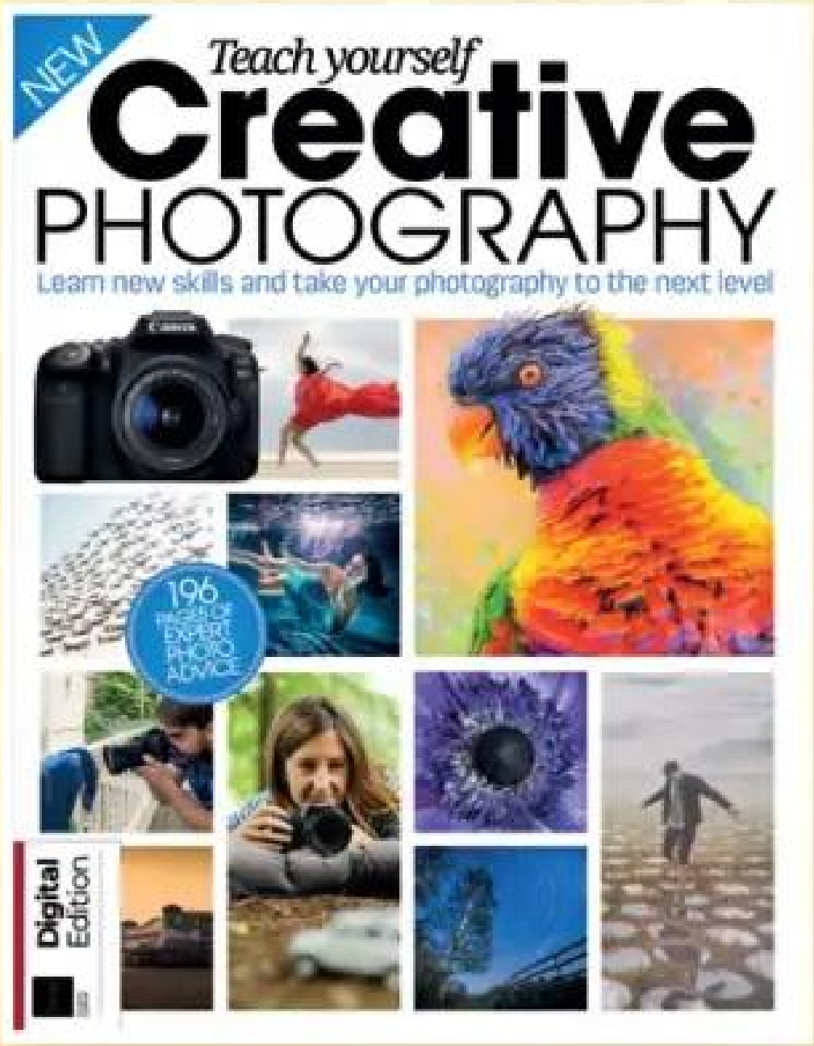
Auto power off 30 sec.
Auto rotate On
Format
File numbering Continuous
LCD auto off Enable
Screen color 3

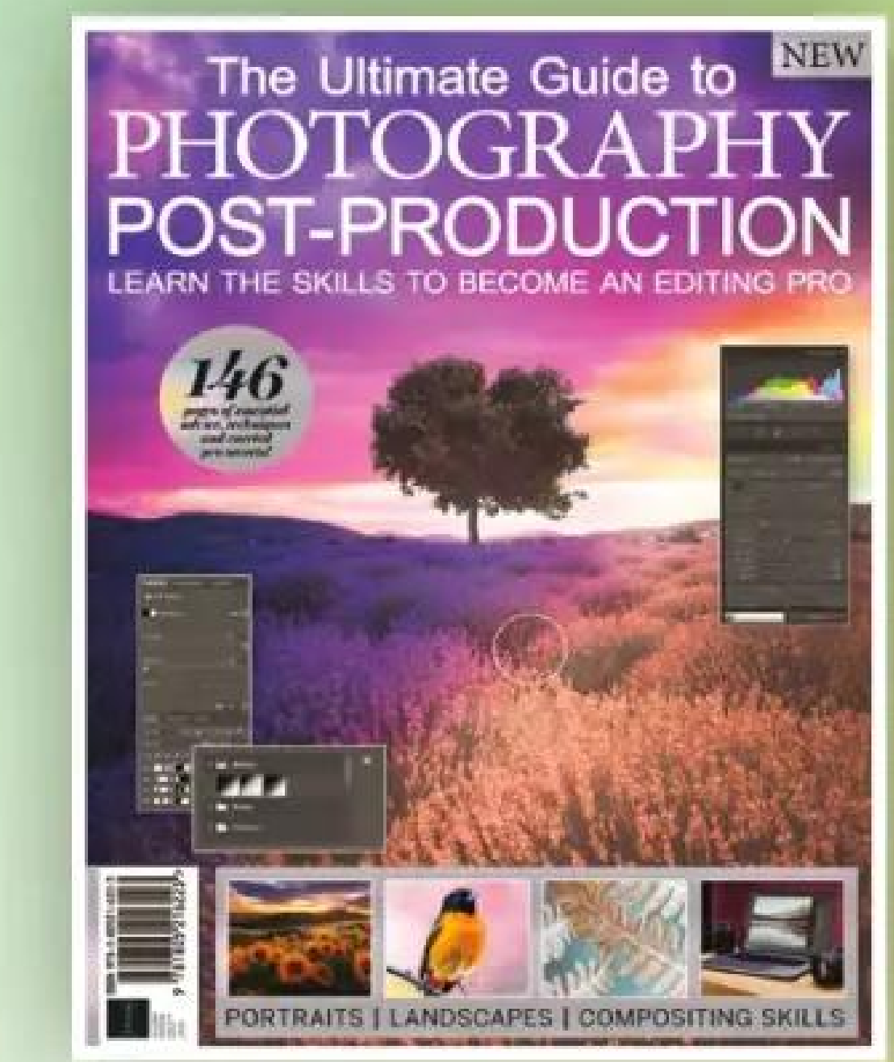
Protect images
Rotate
Erase images
Print order
Slide show

RAW processing power

RAW files need specialist software to be processed – and need to be converted to a file format such as JPEG if they are to be viewed on the web and other PC programs. However, the disadvantages of RAW files are well worth putting up with in order to have the increased flexibility at the editing stage – as you can change colour balance, contrast, exposure and saturation to a far greater degree than is possible with a JPEG.

The compression used by RAW files is fixed, however, on more recent EOS models, the number of pixels actually recorded in an image can be altered. The SRAW and MRAW options, therefore, allow you to retain the editing advantages of the RAW format, while enabling you to fit more images on to your memory card. ■



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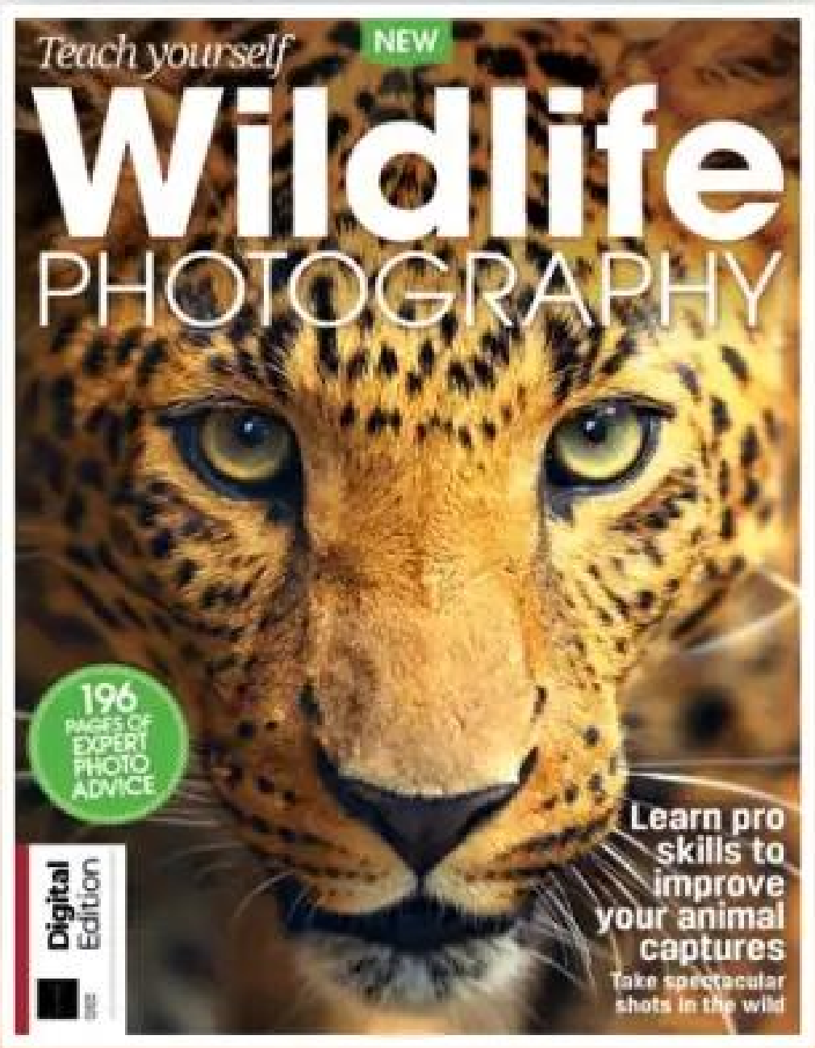
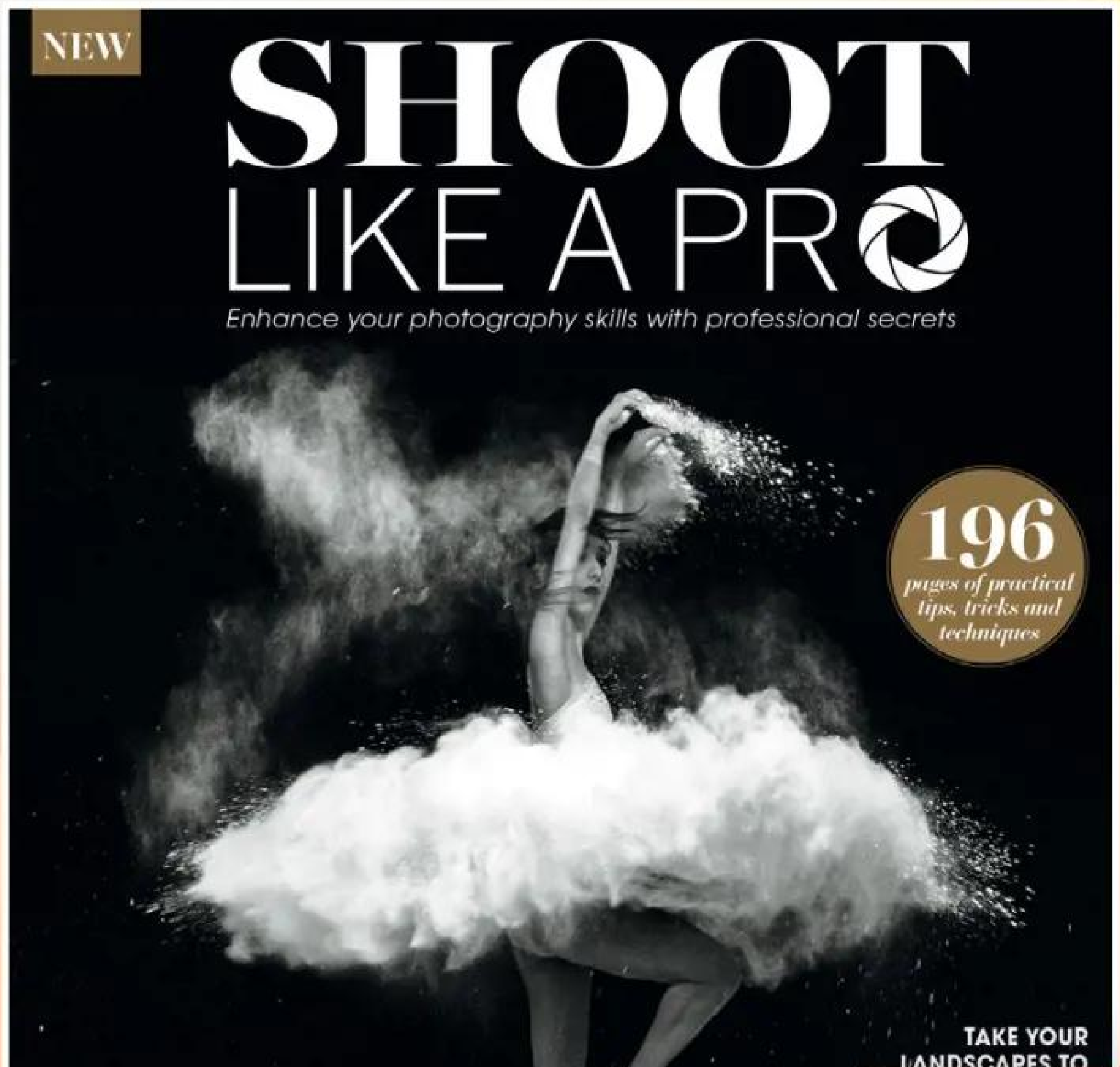
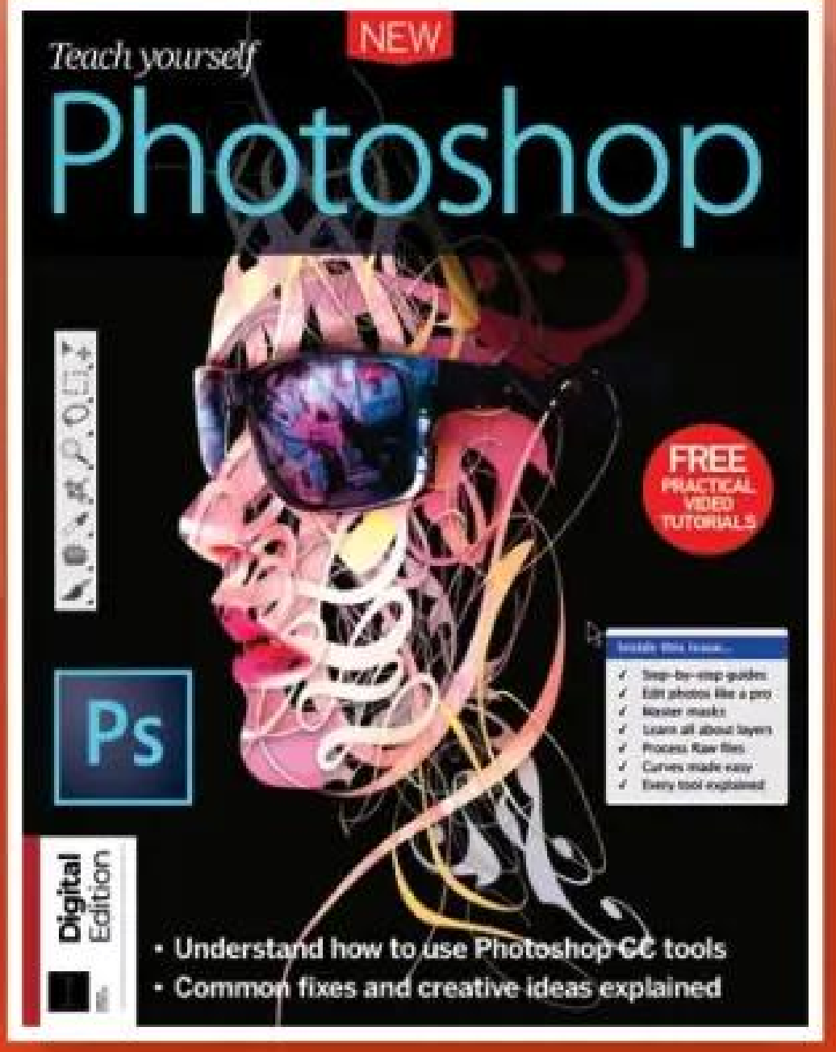

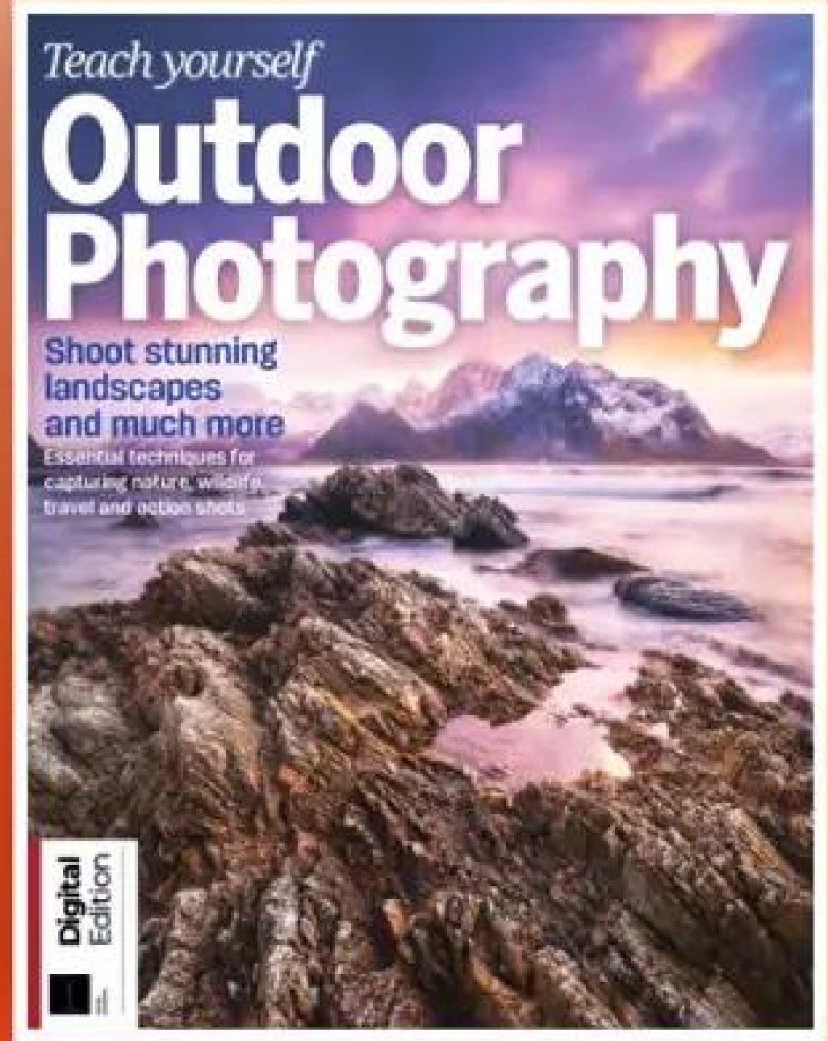

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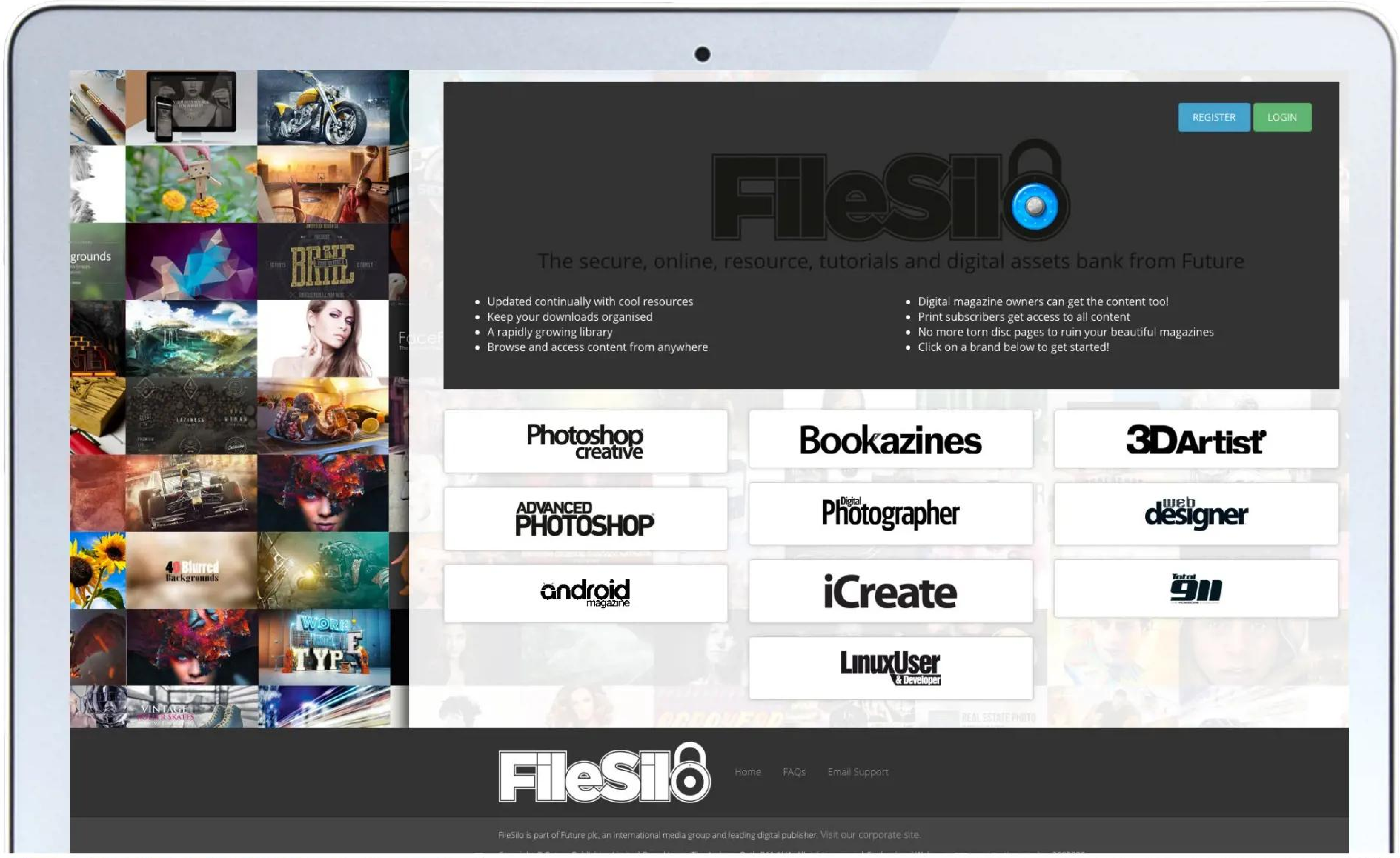
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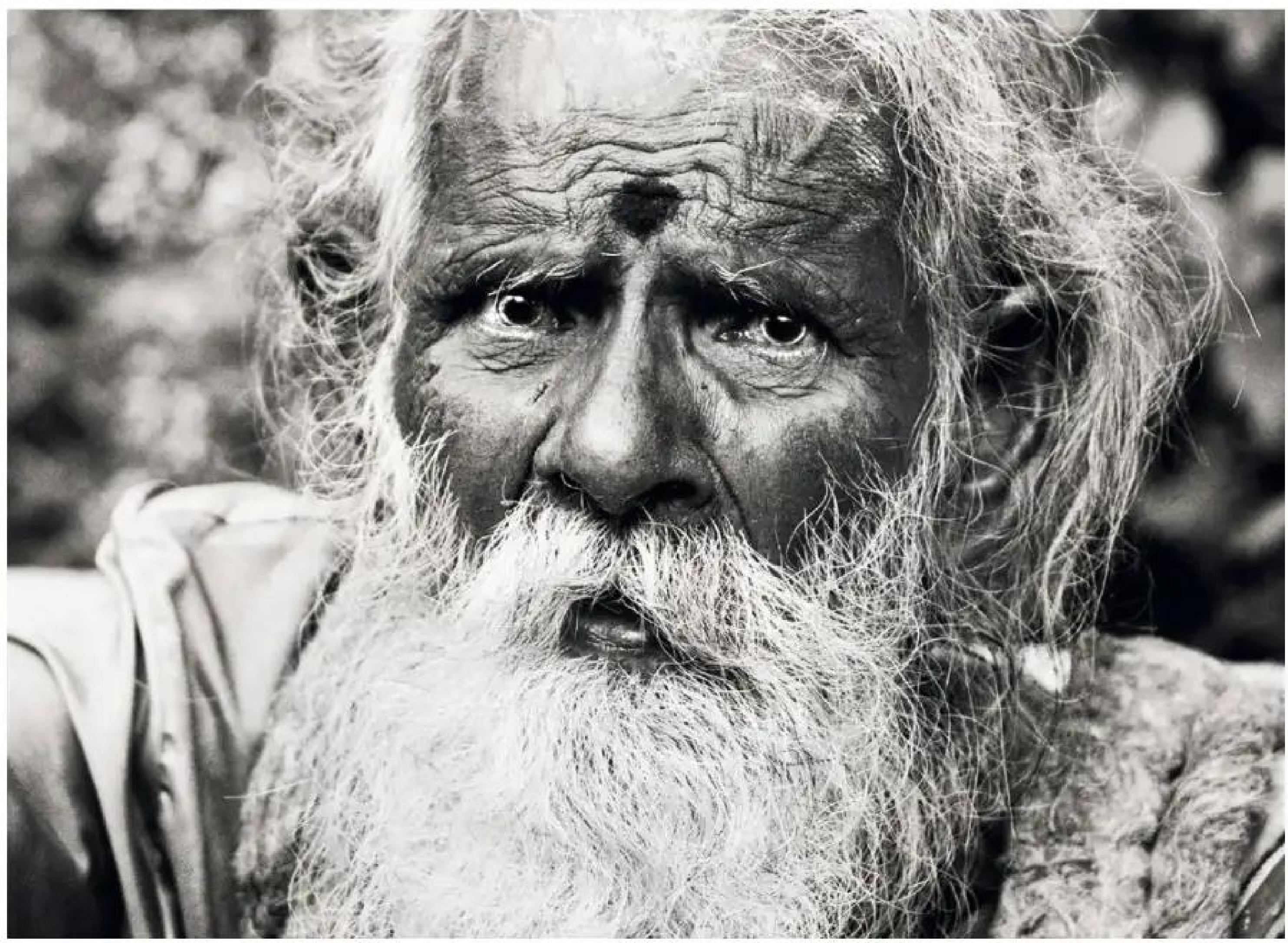

Canon Beginner's Handbook

Learn how to get to grips with your Canon DSLR by following our step-by-step guides, from key camera controls to aperture, shutter speed and ISO set up. Plus a complete SLR College course and 10 free Canon video lessons

Canon Beginner's Handbook

How much depth?

Control the amount of depth of field in your images using the aperture setting on your D-SLR

Mode dial Every exposure mode explained in detail

Canon Beginner's Handbook

Live view in action

Canon menu How to use key settings and features

Canon Beginner's Handbook

Controls overview

Understand each of your new D-SLR's dials, buttons and settings

Camera controls Your DSLR's dials and buttons

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LESSON 1

What is focal length all about?

The anatomy of a Canon lens

SLR College 12-part course on essential techniques

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